

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

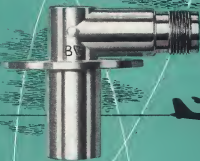
SEPT. 1, 1952

50 CENTS

## SERVING the AVIATION WORLD for 35 YEARS

Our 35 years of engineering experience in aviation design and manufacture is your assurance of the finest in quality aviation products.

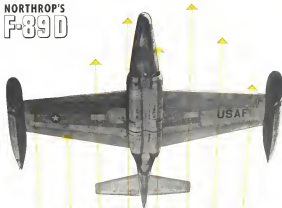
Symbols of engineering excellence and dependable performance, BG products are the choice wherever quality products are specified.



THE **BG** CORPORATION  
136 WEST 52nd STREET,  
NEW YORK 19, N. Y.



# NORTHROP'S F-89D



## to carry Janitrol specialized equipment

blowby heaters  
thermal exchangers  
jet gas generators  
liquid or coolant heaters  
portable ground heaters  
in-line heaters  
heat exchangers

Among up to the minute advancements on Northrop's latest version of the "Scorpion" all-weather interceptor fighter is the addition of Janitrol specialized equipment. Jet power—the destructive punch of rockets—propellant aircraft warning and firing equipment—radar search eyes—and the new factor of safety added by Janitrol, help make the newest "Scorpion" a finer weapon for the Air Force . . . and another example of Janitrol combustion engineering in action—wherever aircraft make noise.

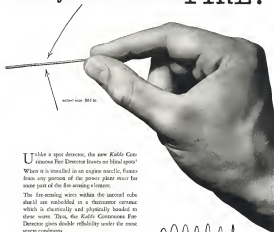
# Janitrol



AIRCRAFT-AUTOMOTIVE DIVISION, SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO

1 - 8, 10th, 22 Broadway New York N.Y. • C. B. Anderson 528 W. 10th St., St. Paul, Minn. • C. L. Smith 31st Midwest Bld. Detroit, Mich. • T. E. Smith 400 East 10th Highway Minneapolis N.C. • J. H. & J. H. Smith 1000 10th St. SE Atlanta, Ga. • J. H. Smith 1000 10th St. SE Atlanta, Ga. • J. H. Smith 1000 10th St. SE Atlanta, Ga. • J. H. Smith 1000 10th St. SE Atlanta, Ga.

## ...the tiny wire that screams FIRE!



Unlike a spot detector, the new Kidde Continuous Fire Detector leaves no blind spots! When it is installed in an engine nacelle, flames from any portion of the power plant must hit some part of the fire-sensing elements.

The fire-sensing wires within the incoated tube shield are embedded in a thermistor ceramic which is chemically and physically bonded to these wires. Thus, the Kidde Continuous Fire Detector gives double reliability under the most severe conditions.

The result is that in over 2,000 hours of actual flight tests there is not one report of a false alarm, although several fires were detected.



the new KIDDE continuous fire detector permits  
NO BLIND SPOTS...  
NO FALSE ALARMS

# Kidde

Walter Kidde & Company, Inc.  
428 Main St., Belleville 9, N. J.

The word "Kidde" and the Kidde logo are trade marks of Walter Kidde & Company, Inc. and its associated companies.



In Canada: Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.






Members 9

Tankers En and Range of Navy Sea...	11
CAR 444: 2. only in Robin Lane...	12
5-17 America at	12
AB Skye: 4.40	12
USAR speeds Up Transverse Study	14
Drug Chaser: Something for Nothing	17
3-240: Dispute: New Fire Power	17

Magnesium as a Plant Mineral	21
Prisoner's Rights: SRA's Deadline	29

News Report	1
Executive Calendar	1
Picture Post	1
Who's Where	10
Industry Observer	10
Washington Roundup	12
USAF Contracts	12

	Relative
1	100
2	100
3	100
4	100
5	100
6	100
7	100
8	100
9	100
10	100
11	100
12	100
13	100
14	100
15	100
16	100
17	100
18	100
19	100
20	100
21	100
22	100
23	100
24	100
25	100
26	100
27	100
28	100
29	100
30	100
31	100
32	100
33	100
34	100
35	100
36	100
37	100
38	100
39	100
40	100
41	100
42	100
43	100
44	100
45	100
46	100
47	100
48	100
49	100
50	100
51	100
52	100
53	100
54	100
55	100
56	100
57	100
58	100
59	100
60	100
61	100
62	100
63	100
64	100
65	100
66	100
67	100
68	100
69	100
70	100
71	100
72	100
73	100
74	100
75	100
76	100
77	100
78	100
79	100
80	100
81	100
82	100
83	100
84	100
85	100
86	100
87	100
88	100
89	100
90	100
91	100
92	100
93	100
94	100
95	100
96	100
97	100
98	100
99	100
100	100

## Wardlaw, H. J.

## Richard M. Davis

Almonder McBurney	Archives Editor
Daryl A. Ambler	English Editor
Irving Stone	Reviews Editor
G. L. Christian III	Editorial & Manuscript
Katherine Johnson	Graphic
Don S. Lee	Library
F. Lee Moore	Design
Philip Kluge	Editor
Scott Roulger	New Products

Erwin J. Baiken	Special Assignments
William J. Campbell	West Coast
Byron C. Dunspey	Dayton
A. W. Evans	North Central
Henry Lefor	North South
Vernon Gosselin	Editorial Services
Leo V. Torrey	Printing & Production
Malva Roth	General Services

William Bennett      1946-47, 1948-49, 1950-51

**Editorial Office:** 340 West 41st St., New York 14, N. Y. Phone: Langmuir 3-1000 or 3-1001. Telex: 253 511. **Post Office:** 450 Lexington St., N. Y. C. Phone: National 4-1400.  
**Executive Vice President:** Arthur S. 1-101. **Wizards-Harmony:** Hilda S. Chicago 14, 320 N. Michigan Ave., Cleveland 22, Harvey Hild. **Directors:** Ben, Penumbra-Hild. Los Angeles 17, 1111 Wilshire Blvd., San Francisco 4, Ed Fern 16, Shannon 2, 346 St. M. Publishing.  
**Correspondence in more than 40 major cities:**  
**Foreign News Bureau:** London, Paris, Frankfurt, Tokyo, Manila, Rio de Janeiro, Caracas City. **Correspondence in more than 35 major cities:**  
**Editorial Office:** 340 West 41st St., New York 14, N. Y. Phone: Langmuir 3-1000 or 3-1001. Telex: 253 511. **Post Office:** 450 Lexington St., N. Y. C. Phone: National 4-1400.

Robert F. Eager

Robert F. Beyer

B. W. Martin, Jr., General Manager, J. G. Johnson, Business Manager, Mary Morgan, Research and Marketing, Sales Representatives: J. C. Anthony, New York; E. P. Johnson, Cleveland; L. J. Bell, Chicago; W. E. Bennett, St. Louis; L. F. Birchard, Jr., Boston; James Cook Dallas; R. C. Medsker, Atlanta; S. F. Dorfman, Jr., San Francisco; C. F. McElvaine, Los Angeles; W. S. Henry, Philadelphia. Other sales offices in Pittsburgh, Detroit, London.

September 1, 1991

## ANOTHER WEEK

Figure 1. *Staphylococcus aureus* strains.

[illegible]

A daring flier of the twenties, Major Knudolph ("Shorty") Schroeder, sent his super-charged Le Prie plane to its steepest roll of 36,100 feet back in 1920 to set a new world record. He captured nation-wide acclaim for one of the greatest feats of the sky.



Another day, another record! Just thirty-one years later in Mono Dry Lake, California, the U. S. Navy's Skyrocket powered by 4 rockets and air launched from a modified B-29 bomber, soared into space at "unprecedented" heights and speeds, trapping all previous speed and altitude records.

Figure 1. The effect of the concentration of the solution on the adsorption of the dye. The concentration of the solution was 0.01, 0.02, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 15.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 150.0, 200.0, 300.0, 400.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0, 1500.0, 2000.0, 3000.0, 4000.0, 5000.0, 6000.0, 7000.0, 8000.0, 9000.0, 10000.0, 15000.0, 20000.0, 30000.0, 40000.0, 50000.0, 60000.0, 70000.0, 80000.0, 90000.0, 100000.0, 150000.0, 200000.0, 300000.0, 400000.0, 500000.0, 600000.0, 700000.0, 800000.0, 900000.0, 1000000.0, 1500000.0, 2000000.0, 3000000.0, 4000000.0, 5000000.0, 6000000.0, 7000000.0, 8000000.0, 9000000.0, 10000000.0, 15000000.0, 20000000.0, 30000000.0, 40000000.0, 50000000.0, 60000000.0, 70000000.0, 80000000.0, 90000000.0, 100000000.0, 150000000.0, 200000000.0, 300000000.0, 400000000.0, 500000000.0, 600000000.0, 700000000.0, 800000000.0, 900000000.0, 1000000000.0, 1500000000.0, 2000000000.0, 3000000000.0, 4000000000.0, 5000000000.0, 6000000000.0, 7000000000.0, 8000000000.0, 9000000000.0, 10000000000.0, 15000000000.0, 20000000000.0, 30000000000.0, 40000000000.0, 50000000000.0, 60000000000.0, 70000000000.0, 80000000000.0, 90000000000.0, 100000000000.0, 150000000000.0, 200000000000.0, 300000000000.0, 400000000000.0, 500000000000.0, 600000000000.0, 700000000000.0, 800000000000.0, 900000000000.0, 1000000000000.0, 1500000000000.0, 2000000000000.0, 3000000000000.0, 4000000000000.0, 5000000000000.0, 6000000000000.0, 7000000000000.0, 8000000000000.0, 9000000000000.0, 10000000000000.0, 15000000000000.0, 20000000000000.0, 30000000000000.0, 40000000000000.0, 50000000000000.0, 60000000000000.0, 70000000000000.0, 80000000000000.0, 90000000000000.0, 100000000000000.0, 150000000000000.0, 200000000000000.0, 300000000000000.0, 400000000000000.0, 500000000000000.0, 600000000000000.0, 700000000000000.0, 800000000000000.0, 900000000000000.0, 1000000000000000.0, 1500000000000000.0, 2000000000000000.0, 3000000000000000.0, 4000000000000000.0, 5000000000000000.0, 6000000000000000.0, 7000000000000000.0, 8000000000000000.0, 9000000000000000.0, 10000000000000000.0, 15000000000000000.0, 20000000000000000.0, 30000000000000000.0, 40000000000000000.0, 50000000000000000.0, 60000000000000000.0, 70000000000000000.0, 80000000000000000.0, 90000000000000000.0, 100000000000000000.0, 150000000000000000.0, 200000000000000000.0, 300000000000000000.0, 400000000000000000.0, 500000000000000000.0, 600000000000000000.0, 700000000000000000.0, 800000000000000000.0, 900000000000000000.0, 1000000000000000000.0, 1500000000000000000.0, 2000000000000000000.0, 3000000000000000000.0, 4000000000000000000.0, 5000000000000000000.0, 6000000000000000000.0, 7000000000000000000.0, 8000000000000000000.0, 9000000000000000000.0, 10000000000000000000.0, 15000000000000000000.0, 20000000000000000000.0, 30000000000000000000.0, 40000000000000000000.0, 50000000000000000000.0, 60000000000000000000.0, 70000000000000000000.0, 80000000000000000000.0, 90000000000000000000.0, 100000000000000000000.0, 150000000000000000000.0, 200000000000000000000.0, 300000000000000000000.0, 400000000000000000000.0, 500000000000000000000.0, 600000000000000000000.0, 700000000000000000000.0, 800000000000000000000.0, 900000000000000000000.0, 1000000000000000000000.0, 1500000000000000000000.0, 2000000000000000000000.0, 3000000000000000000000.0, 4000000000000000000000.0, 5000000000000000000000.0, 6000000000000000000000.0, 7000000000000000000000.0, 8000000000000000000000.0, 9000000000000000000000.0, 10000000000000000000000.0, 15000000000000000000000.0, 20000000000000000000000.0, 30000000000000000000000.0, 40000000000000000000000.0, 50000000000000000000000.0, 60000000000000000000000.0, 70000000000000000000000.0, 80000000000000000000000.0, 90000000000000000000000.0, 100000000000000000000000.0, 150000000000000000000000.0, 200000000000000000000000.0, 300000000000000000000000.0, 400000000000000000000000.0, 500000000000000000000000.0, 600000000000000000000000.0, 700000000000000000000000.0, 800000000000000000000000.0, 900000000000000000000000.0, 10000000



● This remarkable thirty-year record of progress is indicative of the course that lies ahead! There is no limit to the virtues that may be opened up for those who try!

And future improvements in design, speed and endurance of planes will be matched by equally important developments in aviation fuels.

Phillips Petroleum Company will continue to contribute to this program according to the very latest in the needs of motive aviation. As one of the nation's largest suppliers of dependable aviation products for commercial and military use in all ranges of flight, Phillips is ready today with new fuels for the latest turbo-prop and jet — in addition to tremendous capacity for producing 115/100 grade aviation gasoline. When you want dependable, high-performance aviation products—call on Phillips!

AVIATION DIVISION  
PHILLIPS PETROLEUM COMPANY  
BARTLESVILLE, OKLAHOMA



## AVIATION PRODUCTS



# There is no Substitute for Experience

4 CFM  
3000 PSI

2 CFM  
3000 PSI

3.4 CFM  
1500 PSI

1952

1950

1942

1952

4 CFM  
3000 PSI

52

Since 1942 Cornelius has built over 25,000 high pressure air compressors for the Navy, Air Force and leading aircraft manufacturers. These 80 years of research and manufacturing experience have given us the "know-how" that few, if any, can approach in our field. The basic design of our new 4 CFM 3000 PSI Compressor has been proven by thousands of hours of service. This unit has been added to our line of dependable compressors to meet a specific need of the Air Force and Navy and to keep abreast of the advanced requirements of the aviation industry. Profit from our years of experience—write to us about your compressor requirements.

**THE Cornelius COMPANY**  
164 9th Avenue N.E., Minneapolis 31, Minn.  
Pioneers in the Development of Aircraft Pneumatic Systems

## NEWS DIGEST

### Domestic

Fan American Airport spokesman has stated that the carrier is ready to sign contracts for ten DRI Connect Series II jet transports, despite a statement attributed to BNA's Chairman Sir Miles Thomas that such was the case. The FAA official stated that "study of Connect and other jet transport proposals has not been completed."

Four new Navy jet fighters, the North American F-4 Phantom II, McDonnell F2H-3 Banshee, Douglas F7U-3 Cutlass and Grumman F9F-8 Cougar have been given their initial carrier trials aboard the USS Midway.

Cool aircraft exports, planes of 6,000 lb. and less, totaled 27 units during July with dollar value of \$177,735. This brings seven months total of such planes shipped ahead to 282 with worth \$1,450,458.

USAF jet fighter accidents per 100, 000 hr. flown during first half of this year totaled 79 compared with 181 the same period last year and 97 during the last half of 1951. Bomber crashes dropped from 26 in first half of 1951 to 16 in first six months this year. Air Force's major accident rate during initial half of this year totaled 26 for each 100,000 hr. flown.

Republic Aviation Corp. workers have been granted an eight-hour hourly increase under NLRB ruling. Year's 21, 000 employees also got new additional paid holiday, three-and-a-half pay for Saturdays, double time for Sundays, accrued vacation benefits in case of death. Republic and the union had asked NLRB for 15-cent increase.

May Gen. John E. Upson, USAF (Ret.), one-time commanding general of the 4th AF, died Aug. 18 at the age of 61.

Proco Products division of Borg-Warner Corp., Cleveland, has secured a contract with Ford Motor (CFO) to produce a modified engine shop model power increase of 24 cents hourly and other benefits. About 1,000 Proco work on are covered.

U. S. Army has transferred regional office for training, supply and logistics of all its some 1,783 aircraft from the Civil Service Corps to the Transportation Corps.

Navy has signed contract with Coors



POLLER HORNET may get powered up for tests by the Navy, Navy and Marine Corps, with delivery scheduled for next June. This is one of the boat's two engines during a demonstration of its capabilities at Fort Ord, Calif. A "monitored" engine lies in the angle later on the boat's left side.

the boat's two engines during a demonstration of its capabilities at Fort Ord, Calif. A "monitored" engine lies in the angle later on the boat's left side.

Aircraft Co., Wichita, Kan., for a helicopter approach program including design studies, experimental production and flight tests.

Gen. Hoyt S. Vandenberg, USAF Chief of Staff, returned to his Pentagon desk Aug. 25 following convalescence from major abdominal surgery on May 7.

First ten P-51 Mustang IIU airplane jets, which have been ordered back into service for participation in Operation Main Force, North Atlantic NATO fleet maneuvers. The IIU's have been grounded for about three weeks due to cooling problems in the Continental engine. A modification program on all IIU's in service with the Navy is now under way and changes will be incorporated in future production versions of both Navy and Air Force models.

"Mother" Boeing B-47 with only about two days into the Gulf of Mexico by enter when an F-100D jet bomber fighter fired a load of rockets into a winged of the inconspicuous, cloudless drone B-47, the intended target. Two of the crew had been rescued at present. The machine recovered Aug. 25 during tests of the F-100D's Mighty Mouse rockets being conducted by Eglin AFB, Fla.

### Financial

Solar Aircraft Co., San Diego, Calif., reports sales of \$15,791,280 for the first quarter of fiscal 1952, up 45% over the same period last year. Net revenue after taxes and all charges was \$333,680, more than five times higher than

the similar period last year. Sales last year a regular 25-cent dividend on common stock, payable Oct. 15 to holders of record Sept. 30.

Sperry Corp., N. Y., has declared a 50-cent quarterly dividend, payable Sept. 17 to holders of record on Sept. 2.

General Dynamics Corp., (formerly Electric Boat) and its subsidiary, Canadian Ltd., note that consolidated net earnings for six months ended June 30 were \$2,091,000, up approximately 70% over the same period last year. Consolidated net sales totaled \$30,111,300, a 68% boost.

### International

The Handled 180 to-a-unit all weather twin-engine fighter has flown at supersonic speeds "several times," according to the maker.

English Electric Canberra two-jet bomber made rendezvous evening crossing of the Atlantic from Aldergrove, North Ireland, to Gander, Newfoundland, and return in elapsed time of 10 hr. 5 min., 42 sec., including time for launch and refueling. Flight was made Aug. 26 at average speed of 590 mph.

Air-faring tests may have helped save 50 of the 75 people aboard an Aerovox Ltd., Hamilton, Pa., Hercules that ditched into the Mediterranean Aug. 27. In a previous crash at a HP Hercules (military Hercules) with several seats in North Africa, all passengers were absent, though the crew was killed.



standard of the aircraft industry



## COUNTLESS THOUSANDS of aircraft have been built faster and better with **3H** safety clamps

Since the beginning of World War II, 3H Safety Clamps and applying tools have proved their superiority in high speed sheet metal fabrication and other applications in the aircraft industry. Today 3H Safety Clamps are preferred many times over all others because of their increased design, operational efficiency, safety and adaptability.

3H Safety Clamps are quickly and easily applied and removed, with maximum safety. They hold securely under all conditions and withstand considerable abuse.

The several basic types shown below are available in sizes to fit various size drill holes and thicknesses of material. Special clamps can be developed for your specific requirements. Write today for catalog.



## AVIATION CALENDAR

- Sept. 3-7—Society of British Aircraft Constructors annual dinner, Portsmouth, England.
- Sept. 4—Centennial of Engineering Association Hotel Kasloberber, Chicago.
- Sept. 4-6—Eighty National Conference on Industrial Hygiene, Sheraton Hotel, Chicago.
- Sept. 5-7—Preconference instrument course, dinner, dinner, Instrument Society of America national instrument conference, Case Institute of Technology, Cleveland. Said advance conferences to P. V. Jones, Instrument Society of America, Pittsburgh 31.
- Sept. 7-12—American Society of Mechanical Engineers fall meeting, Sheraton Hotel, Chicago.
- Sept. 8-12—Instrument Society of America seventh national instrument conference and exhibit, Cleveland.
- Sept. 8-13—American Rocket Society fall meeting, Hotel Sheraton, Chicago.
- Sept. 14-25—Automobile Fair, Fiesler Airport, Milan, Italy.
- Sept. 18-19—International Air Transport Association annual general meeting, Geneva, Switzerland.
- Sept. 21-23—Air Transport Association engineering and maintenance conference, Sheraton Hotel, Miami Beach, Fla. (closed meeting this year).
- Sept. 23-28—Radio Technical Commission for Aeronautics fall general meeting, Hotel Statler, Buffalo, N. Y.
- Sept. 28-30—Auto Medical Association meeting, Paris, France.
- Sept. 29-Oct. 1—National Electronics Conference, Sheraton Hotel, Chicago.
- Sept. 30-Oct. 2—Aviation Space, Flight and Systems Conference sponsored by Chapman Space Flight Co., Toledo.
- Oct. 1-4—Society of Automotive Engineers national aeronautical meeting, aircraft engineering display and aircraft production forum, Hotel Statler, Los Angeles.
- Oct. 7-8—Aviation Electrical Society ninth annual dinner meeting, Fair Hotel, Los Angeles.
- Oct. 9-30—Support management operations conference, Oklahoma University.
- Oct. 11-13—Fourth annual All Texas Air Fair, information available from Texas Aeronautics Commission, Austin.
- Oct. 25-Nov. 2—International aviation and travel exposition, New York, Chicago.
- Oct. 25-28—Transport Aircraft Symposium, Sheraton Conference, sponsored by Valco, Inc., Hotel Park Sheraton, Denver.
- Nov. 6-7—National Inlets and Lubricants meeting, Society of Automotive Engineers, The Mayo, Tulsa, Okla.

### PICTURE CREDITS

1-10—Bettmann Midwestern; 11-12—Hulton-Edwards; 13-14—Hulton-Edwards; 15-16—Hulton-Edwards; 17-18—Hulton-Edwards; 19-20—Hulton-Edwards; 21-22—Hulton-Edwards; 23-24—Hulton-Edwards; 25-26—Hulton-Edwards; 27-28—Hulton-Edwards; 29-30—Hulton-Edwards; 31—Hulton-Edwards; 32—Hulton-Edwards; 33—Hulton-Edwards; 34—Hulton-Edwards; 35—Hulton-Edwards; 36—Hulton-Edwards; 37—Hulton-Edwards; 38—Hulton-Edwards; 39—Hulton-Edwards; 40—Hulton-Edwards; 41—Hulton-Edwards; 42—Hulton-Edwards; 43—Hulton-Edwards; 44—Hulton-Edwards; 45—Hulton-Edwards; 46—Hulton-Edwards; 47—Hulton-Edwards; 48—Hulton-Edwards; 49—Hulton-Edwards; 50—Hulton-Edwards; 51—Hulton-Edwards; 52—Hulton-Edwards; 53—Hulton-Edwards; 54—Hulton-Edwards; 55—Hulton-Edwards; 56—Hulton-Edwards; 57—Hulton-Edwards; 58—Hulton-Edwards; 59—Hulton-Edwards; 60—Hulton-Edwards; 61—Hulton-Edwards; 62—Hulton-Edwards; 63—Hulton-Edwards; 64—Hulton-Edwards; 65—Hulton-Edwards; 66—Hulton-Edwards; 67—Hulton-Edwards; 68—Hulton-Edwards; 69—Hulton-Edwards; 70—Hulton-Edwards; 71—Hulton-Edwards; 72—Hulton-Edwards; 73—Hulton-Edwards; 74—Hulton-Edwards; 75—Hulton-Edwards; 76—Hulton-Edwards; 77—Hulton-Edwards; 78—Hulton-Edwards; 79—Hulton-Edwards; 80—Hulton-Edwards; 81—Hulton-Edwards; 82—Hulton-Edwards; 83—Hulton-Edwards; 84—Hulton-Edwards; 85—Hulton-Edwards; 86—Hulton-Edwards; 87—Hulton-Edwards; 88—Hulton-Edwards; 89—Hulton-Edwards; 90—Hulton-Edwards; 91—Hulton-Edwards; 92—Hulton-Edwards; 93—Hulton-Edwards; 94—Hulton-Edwards; 95—Hulton-Edwards; 96—Hulton-Edwards; 97—Hulton-Edwards; 98—Hulton-Edwards; 99—Hulton-Edwards; 100—Hulton-Edwards.



**BRITANNIA'S FIRST FLIGHT**—The big Bristol Beaufort torpedo bomber (left) Bristol Beaufort shown taking off from Filton on its maiden flight Aug. 15 (above) and flying on the water (below). Part top of the aircraft, which is scheduled for B.O.A.C. service between Canada and Britain, loaded 30 men and was described "completely satisfactory" by chief test pilot Sqn. Ldr. Lyall. Detailed engineering story on the new aircraft begins on p. 50. One busy-fourty version of the Beaufort will cost \$9.



## New Turboprop Airliners Shown

PRINCESS READY FOR DEBUT—Fitted under the low wing and of a sister ship, the large four-engine flying boat (left) Bristol Beaufort will be the busy part piece in its launching. The big plane left the water at Filton on its maiden flight Aug. 12. Spanning 120 ft. and 145 ft. long, the Princess weighs 140 tons and is designed to cruise at over 114 mph. It can reach approximately 100.



for these VITAL AIRCRAFT REQUIREMENTS...

SERVICE

REX-FLEX

SERVICE	REX-FLEX
Low tension shielding cordset	✓
Cabin heating and ventilating ducting	✓
Drinking ducting	✓
Fuel filter socks and vents	✓
Governor bleed tubes	✓
Fuel lines	✓
Drain lines	✓
Exhaust lines	✓
Carburetor or intake	✓
Fuel pump control assembly	✓
Super charger assembly	✓
Fuel regulator bellows	✓
Scavenger oil return	✓
Air scoop assembly	✓
Heater heater duct	✓
Vacuum pump lines	✓

**combines the durability of stainless steel**

In the many critical connections above where flexibility must be combined with rugged durability, the engineering "know-how" and manufacturing skill that goes into every KEX-PLUX assembly is of primary importance. Because so much depends upon this piece of analytical steel, you cannot afford to gamble. *Pneumatic Corporation* offers experience second to none in the development and fabrication of all types of flexible analysis and computer for stress. In addition to these applications indicated, it is the composite piece on drive units illustrated above. *Pneumatic Corporation* manufactures water and air motors for 100.

Whatever your needs in stainless steel flexible metal hose, bellows, ducting or flexible metal connectors, HEX-FLEX will provide the answer. Flexomatic engineers will be pleased to go over your requirements with you. Write, wire or phone.

### In the Front Office

**John M. Childress** has been named a vice president of Southern Sawmills, Inc., Atlanta, Ga., said here operation. He will continue to manage the firm's Atlanta base. Childress joined the firm in 1945.

George E. Telle has been named vice president sales for Lord Mfg. Co., Erie, Pa. He joined the company in 1949 as general sales manager after leaving Wright Aeronautical division where he was manager of the contract and sales division. Richard C. Sheehy has been appointed manager of engineering with Lord.

Edgar Schmeed, who recently resigned from North American Aviation, Inc., has joined The Aerostroke Co., Gardena, Calif., as a vice president in charge of negotiating, research and development. Schmeed, who supervised design of the F-71, F-7E, F-7J, F-4E, F-4G was with NAA and its affiliates for approximately 10 years.

John A. Cunningham was general president for Mid-Continent Airlines before its recent merger with Braniff (Avarice Weekly Aug. 18, p. 54). has been appointed assistant operations manager of Braniff. Other former MCA personnel who have taken new positions as a result of the merger include M. L. Walker, now director of economic controls; V. A. Knapp, still assistant; and Rex Allen, manager of maintenance operations.

**Adm. Harold B. Saffels**, USN (Ret.), has joined Chance Vought Aircraft division, United Aircraft Corp., Dallas, Tex., as executive assistant to the general manager.

**Richard T. Niles, Jr.**, has been named manager of production for Westinghouse Electric Corp.'s Aviation Gas Turbine division, Philadelphia, Pa.

Arthur C. Quiberg has been appointed director of engineering and research at the Bend Sinister Corp.'s Radio division, Baltimore, Md., with A. E. Abel as his assistant.

John H. Lison has been designated director of auto manufacturing for Magnetex-Henrywood Regulator Co., Minn.

William S. Misset has been named manager of Society Vietnam Aid Co.'s women department, according to Warren L. Baker, who is retiring.

Edward H. Fureis has been appointed contract administrator-electronics with Engineering and Research Corp., Riverside, Md., and Robert W. Dillon has been named Eya's West Coast administrator.

C. H. Rahn has been placed in charge of all subcontracting and outside production work for Lockheed Aircraft Corp.'s Marietta Co. division.

Robert E. Shindler has joined Parker Appliance Co., Cleveland, Ohio, as product development engineer.

■ Cornell Aeronautical Laboratory is making detailed engineering drawings of the damaged Russian MiG-15 captured by the Air Force in Korea. Industry observers are speculating as to whether this means that the Air Force plans to build a flyable duplicate of the MiG-15 for flight tests.

▼ Three new types of Russian jet fighters have been sighted during the past six months in MIG Alley over Korea. One which looks very much like a high-wing MiG-15 has been sighted as a quadrate configuration. Another has more wing sweep than the MIG-15 and appears to have much better speed and altitude performance than either Russian-built types. This type has been sighted in small groups mostly at the northern edge of MIG Alley close to the Yalu River. Little is known about the third type except that pilots report on sighting it from a distance it appears different than any of the other Russian types seen so far over Korea. Late reports from Korea also indicate that the Gora command jet fighters are now using dog-fight tactics.

✶ Allison divisions of General Motors and Convair jointly brought the jet-powered Turbo-Liner to Washington last week in a final effort to sell the Air Force on converting its T-29 piston-powered navigator-bombardier trainers to turbojet power. Both the T-29 and the Turbo-Liner use the basic Convair-Liner airframe. T-29 is powered by two Pratt & Whitney R2800 engines while the Turbo-Liner uses two Allison T-56 turboprops. The Turbo-Liner's arrival in Washington marks the end of a transcontinental flight for the first turbojet-powered American transport from San Diego via El Paso and Indianapolis.

Lattifeknows extent of fire steel strike on windows has been in delay of new plant construction for the expanded aircraft production program. For example, the new Navy-built Hercules, Mich., plant where Ford's Mercurys divisions has been scheduled to do final assembly and testing of Westinghouse J40 engines has been held back. Erection of structural steel, due to begin about July 6, has been delayed by more than two months. Meanwhile Ford spokesmen have no comment to make about the Campbell recommendation that Mercury be asked to stop looking for the J40 and make the Pratt & Whitney J72 instead.

\*Fletcher Aviation Corp. last week was demonstrating its jet-cooling arrangement for the Beta-Nucleon at Washington National Airport for possible military application to various military aircraft. There is military interest in using jet cooling for helicopter powerplants. It is estimated that 10% of helicopter power in most current design goes into the conventional cooling fan arrangement.

Industry observers are wondering just how much growth potential the Air Force has in reducing the complexity and cost of its aircraft. One in point is the Douglas B-66 which was originally designed for and is being produced by the Navy as the A1H, a conventional bomber. By the time the Air Force material experts finished with their land-based version of the A1D design it was heavier, slower and much more expensive than the Navy version. Normally certain-bid versions of the same design are heavier because of the bonded-up landing gear, tail hook and some landing mechanisms required for shipboard operations. The B-66 is a two-engine, medium bomber that will be produced by the A1D will be built at El Segundo. The B-66 is scheduled to be replaced by two Alliance 717 fighters while the A1D will use a pair of Pratt & Whitney Aircraft 757 odd compressor size

\* Another proof of the old story that aeronautical engineers often come out with the same solution for the same engineering design problem appears in the two most freckle-free designs which have been developed by Canadair Ltd. (the CL-21) and by Fokker in Holland (the F-27). Comparison of subcutaneous and dimensions of these two airplanes is ordered by the manufacturers show close resemblance to the old Boeing freckle-free design, particularly to the most recent one, the Boeing Model 498 local service line (Aviation Week, Nov. 23, 1959) pp. 15-16). The Boeing designer designs were never built.

**S** Corporation

1302 S. Third Avenue • Maywood, Illinois

FORMERLY CHICAGO METAL NOSE CORPORATION

[illegible]

Names identified  
products of Flanagan  
Cooperation that  
have earned authority  
for over 10 years



## Stretching the Stretchout

Stretchout for achievement of a 147-kg Air Force and 16 July accelerated Naval Air center groups down until 1955 to mid-1956 seems to require more from the organization against increasing defense that is increasing throughout the Western world than from success.

When former Defense Secretary Gen. George M. B. Clark, announced the "justified acceleration" program a few months after the Korean outbreak, he emphasized that it would be a long-term, perhaps 20 years or more, sweeping task of endurance. In the two years since then the determination to continue his steadily dwindled and the acceleration program repeatedly stretched out or relaxed.

Now, the target date of the Joint Chiefs of Staff for all-out war readiness, mid-1954, is less than two years off. The original post-Korea JCS target date, mid-1952, has passed.

So far, the military has been able to hold a line, even though a stretching act, against the budget (labeled, accordingly, "military" advocates and others who have aimed at making deep cutbacks in defense.

Advocates of strong defense, such as Sen. Lyndon Johnson, have long spoken in terms of program in pointing to the JCS target date with warning.

But defense leaders are increasingly apprehensive over the mounting pressure to let up on defense and that, if war doesn't come by mid-1954, the pressure for a whole-scale letup may be too great to withstand.

These trends, it is recognized, the military program to make it more palatable to the Congress.

That it means more than accuracy in behind Defense Department's latest stretchout of the 147-kg USAF.

Secretary of Defense has authorized to permit "justified financing" — and has explicitly done so since Korea.

If the \$6.5 billion in the 1953 fiscal year budget to complete the financing of 1,341 planes and "justified financing" of 6,410 additional aircraft required for the "justified" force is not adequate, the secretary has authorized to finance partially the 6,410 and complete the financing next year.

The department did this last year. Of the 7,431 planes ordered in 1952 fiscal year, 1,661 are being financed out of this year's funds.

The Congress approved a 147-kg USAF by mid-1955 as its action on the 1953 budget. This gives the Defense Secretary a strong basis to resist in partial financing to achieve the goal—instead of putting it off to mid-1956.

## More Money?

There is much talk and some planning at the Pentagon on a supplemental appropriation for the 1955 fiscal year to cover increased costs in the military program.

Military men feel there is need for an additional \$5 to \$10 billion, a substantial part of it for aircraft program.

Defense Comptroller W. J. McNair puts \$2 billion as the maximum.

Johnson hinges on the attitude of the next Administration.

## Spending Aircraft Money

Air Force and Navy expenditures for aircraft and re-

lated personnel—the actual amount of money being poured into aviation—has been dropping.

At the start of the fiscal year, July 1, the two services had a total of \$16.6 billion in unexpended funds, most of it already obligated as contracts, but plans and in liquid assets.

During July, an estimated \$540 million was spent for aircraft and related personnel. This is a rate of 56.5 billion a year—a decline of \$16.6 billion.

USAF spent only the year with a \$1.6 billion increase in total balance on hand, boosted to \$27 billion by its \$12.6 billion 1953 appropriation for aircraft and related personnel. During July, USAF spent only \$160 million. Only \$160 million was for complete months.

Naval Aviation started off the fiscal year with an expenditure balance on hand of \$5.9 billion. Its 1953 appropriation increased this to \$9.8 billion. Estimated July expenditure on aircraft and related personnel \$200 million.

## Carrier: Outrun or Torpedo?

The atomic energy, Navy, and aviation, may make the carrier obsolete, available to the air attack by giving it a speed as great as the torpedo—48 knots.

A new Midway-class carrier built a 37-knot speed, which is also the speed estimated for the Franklin D. Roosevelt to increase the speed on the second flush deck, hopes authorized, to exceed 36 knots.

## CAB: Airline Protagonist?

Civil Aeronautics Board is taking up the case of the proposed carrier in their fight with the Post Office.

This is not the Board's second annual "study to develop mail-carrier service and rate structure" means.

A new act, CAB established system-wide cooperative mail rates for domestic carriers. The rate for segment carriers (31 counts a ton-mile) was higher than for the trunk lines (45 cents). The Board explained that costs for the segment lines were higher.

The higher cooperative mail rate for the regional carriers meant that less of their total mail pay showed up in "subsidies."

But, it developed, the regional carriers didn't like the plan. Post Office threatened to channel mail to trunklines.

CAB said at the outset of its study a competitive pattern would be set. "The mail-carrier rate structure will produce the same effective mail rate for identical mail services between two points without regard to the individual carrier operating the service."

The Board will probably do that by basing the cost per mile for each segment of the route that is not in competition with the Big Four Air carrier costs would be an indication that its original approach was a failure. For example:

At its original study, CAB denied that of Capital Airlines' estimated total mail pay for the current 1953 fiscal year of \$1.5 million, \$1.1 million is compensation pay and \$400 million subsidy. This is based on a rate-of-rail rate of 55 cents a ton-mile. If the rate is reduced to 45 cents over some segments, it will have to be increased over others to make the airlines' earnings that \$1.3 million of Capital's total income is compensation.

—Katharine Johnson

# AVIATION WEEK

VOL. 57, NO. 9  
SEPTEMBER 1, 1952

## Tankers Extend Range of Carrier Jets

- Air-to-air refueling will permit fighters to escort fleet bombers to and from target areas.
- So the Navy orders all of its AJ Savages modified for use as either flying tankers or bombers.

The range of Navy carrier-based jet aircraft has been given a major extension by the successful adoption of aerial refueling techniques to current operations. The Navy revealed last week.

Successful experimental operations in which Grumman Panthers and McDonnell Douglas jet fighters were adapted from a North American AJ-1 Savage converted to a fuel tanker have given the Navy plans for all its jets to be in production modified for use as either flying tankers or bombers.

The Savage, a heavy land-based North American jet bomber, is to be at Columbus, Ohio. The Navy also is converting all of its new jet fighters with aerial refueling equipment to operate with the carrier-based Savage tankers.

New Technical Advantage—Transplanting the aerial refueling techniques pioneered by British Fleet Air Arm and widely used by the Air Force is extending the range of its long-range strategic bombers and land-based jet fighters will mean more changes in Navy carrier operating techniques.

Among technical advantages of the system are:

• Jet fighter aircraft can escort carrier-based bombers all the way in and out of the target area.

• Carrier jets can be sustained longer current task loads for long periods without the complicated operations required by frequent refueling and landing when jet fighters have to be refueled on the carrier deck.

• Aerial refueling of both fighters and bombers can be increased considerably. Aircraft can take off with more weight. Additional fuel required for the mission can be added by aerial refueling as soon as the target.

• Equipment Changed—Early experiments at Patuxent River, Md., are in refueling the Panther and Douglas used the NA-1 is a tanker with refueling equipment carried in the tail area using a hose where the jet engine was moved. Normally the AJ-1 is powered by two P-6W R-2800 piston engines

and an Allison J35 jet in the tail. In production versions of the AJ tankers the refueling equipment and extra gas tanks in the bomb bay will be the jet engine will be retained. The Savage will be equipped for later changeable use as either a bomber or a tanker.

All modifications required to shift the aircraft from one function to another can be made at sea with equipment available aboard aircraft carriers.

The Savage was the first Navy carrier-based bomber specifically designed to convert between bomber and tanker to be the standard long-range carrier-based bomber until the completion of the 60,000-ton supercarrier and the introduction of the Douglas sweeping A-1D into service, about three years away.

## CAB Hits 'Laxity' in Robin Case

A long history of CAA leniency, company mismanagement and safety violations was involved in the Robin Air Lines crash fatal to 41 on board a C-46 approaching Los Angeles last April 18, according to the official CAB report.

CAAs' investigation pointed out "fundamental cause of the crash probably was pilot's attempting a visual approach under instrument conditions," CAB says.

CAB had cited Robin for violations more than a year before the fatal crash at Los Angeles. On May 5, 1951, CAA filed a complaint against the company. While that case was being up for hearing, Robin's operating rights expired June 30. So on Aug. 10, 1951, the CAA signed another order forbidding the complaint as it "would have no effect" because the carrier had ceased operating.

Another Case—However, Robin later asked for resumption of its certificate claiming that a company representative had demonstrated the mismanagement originally alleged by CAA. A new operating certificate was then approved by CAA "on the strength of the West Air case," in which CAA dropped suspension proceedings because a new agreement recognized management to

How D. Wills—The Navy's aerial refueling technique uses the British "probe and drogue" method now being built by Fleet Refueling Jet Inc. of Danbury, Conn. The funnel-shaped drogue is trailed from the tanker at the end of a hose. Fighter aircraft are equipped with a probe which the pilot maneuvers to engage the drogue. Connection is made automatically. The fighter disengages by slowing down and pulling out of the tanker to pull the drogue off the probe.

Most Navy fighters will carry the probe in the nose but some models such as the F-100 will carry a probe in the wing. The probe is not carried on the tanker to pull the drogue off the probe.

Since the extra fuel capacity of the Savage is sufficient to refuel more than one fighter at a time it is expected that provision will be made for the fighters to refuel the tanker in the air as well as on the ground.

First public dissemination of the Navy aerial refueling technique was expected to take place at the National Aeronautics Association in Detroit.

CAAs' investigation of the Robin operating certificate last Dec. 18. The decision, in CAB later declared blame, was "a complete lack of the company's long history of questionable operating practices."

Two days later, a Robin C-46 with 45 passengers aboard crashed into a field at Colap, Ontario, Canada. It was not involved before and during the CAB investigation hearing Jan. 24, attended by CAA officials, that the airline had been given a "qualified pilot" and failed to check, there or even report proper flight records.

What is more, on that flight the pilot was only told that it was not sufficient to go to check their destination but had failed to check weather reports. There became hopelessly lost en route, despite having adequate radio equipment.

CAAs' decision—But CAA went substantive in new evidence to start a successful proceeding to revoke an airline's operating certificate. While CAA's fifth Region set about publishing its own evidence, the airline's defense, the chief agent at Los Angeles, Hugh Buehler, asserted administration con-



of in Washington he was keeping an eye on Robo to make sure it operated safely until suspension or restoration proceedings could be started and completed.

But Brewster was killed in an auto crash and that may have delayed action on the case, CAA cannot say. But on Mar. 21, the South Region attorney filed a complaint recommending that CAA Administrator Charles Egan revoke Robo's operating certificate.

One month later, the Robo C-46 crashed into a hill approaching Los Angeles. CAA then issued an emergency order suspending Robo's operations, and the South Region attorney filed supplemental charges in the re-voicing proceeding.

■ The CAA investigation also reveals that Pilot Powell was present prior to this flight and on previous ones for Robo, despite a medical certificate suspension because of heart ailment. He had a good reputation as a pilot.

Even those who suggested his well-aid certificate testified that they did not notice the location written on it.

■ The aircraft was "well maintained and it was in as seaworthy condition when it crashed." It hit with both engines operating, wheels extended, flaps on.

■ The radio equipment was found to project clearly, so far in evidence from the wreck could be placed together.

■ Whether was flying in straits and fog had spread inland and at the time of the crash apparently shrouded the hill under the approach to Los Angeles Airport. But the report was open, with a 700-foot ceiling and 25-mile visibility. The plane hit at altitude 900 ft, minimum allowable altitude on instrument approach at that area is 5,000 ft. The crash site was 2,500 ft north of the coastline of the LGB to which it was bound. Witnesses in the area reported a plane flew back and forth at

low altitude in the area about the time of the crash.

CAA concludes that the pilot was as familiar with the area he thought he could dash in under the aircraft.

■ CAA Safety Compliance—Here is how CAA safety enforcement action came, according to CAA general counsel Richard Elliott. The safety agent in the field has several ways to find safety violations: stop inspection, issuance orders, check, record inspection, complaints from officials and civilians.

A minor infraction of rules is dealt with on the spot. The agent issues the citation and proposes a "warning order for 60" as the infraction and what was done about it.

In case of a major violation, the agent must file an alleged violation report, including what he found and what the owner said about it. The original goes to regional CAA office and a copy to the Washington office.

The regional supervising agent and counsel check it over. A committee then determines proper action.

The case may be dropped, settled on a compromise fee basis, or passed through formal proceeding to a final decision. If fine, suspended or revoke the owner's certificate.

## New CRO Offices

Durham-Birmingham seeking contact with civilian and military personnel at Air Materiel Command and Wright Air Development Center are now using the newly completed facilities of the Connecticut Research Office assigned to the Research Center in Area B. Under the new setup, visitors do not need a pass to use the facilities. Another convenience is location of a parking lot for manufacturers' representatives near the Reception Center CRO near Route 4.

## B-47 Armament

- Emerson turret system replaced by GE's.
- But former is termed fundamentally sound.

Contracted analysts observed last week called the Emerson Electronic Company turret control armament system approach a "fundamentally sound" one, despite the problems the St. Louis manufacturer has encountered in supplying weapon controls for the Boeing model B-47.

They feared that the system probably will go into use later after more development time and after the problem Emerson met was resolved.

This interpretation followed an assessment by USAF Undersecretary Russell L. Galtman that \$105 million in Emerson contracts for the turret fire control systems for the B-47s have been "voided out."

Galtman said that General Electric Co. had been awarded a contract for an advanced armament system and that, pending the GE contract, Emerson Electric is turning off turret systems with the dual purpose of getting the bomber some defensive armament and stopping some of the loss of USAF money invested in the original system.

■ Legend Supply—Source close to the electronics and armament picture said that the original contract went to Emerson in 1946 as a result of USAF planning to expand its arsenal for each deployment. At war's end, only General Electric was in the armament control business to any appreciable extent. Galtman had done some studies about that, during the war. But USAF wanted additional sources, and picked Emerson, with its wartime experience in local control turrets, as a logical supplier.

Original of the Emerson system was ordered by Dr. Stark Draper of the Massachusetts Institute of Technology and to Brig. Gen. Laughlin Davis, assistant director of Air Research and Development Command. Draper was retained as a consultant to Emerson.

What followed was a story of one difficulty after another, and worse and more Air Force money being poured in because research appeared "just around the corner."

Some troubles were analyzed as:

- A very advanced system design, in which system stability was the critical problem.
- Lack of previous experience with the critical stability problem of remote turret fire over strikes than local control turrets.

After Emerson had been working on its contract for approximately two years, USAF asked General Electric to see if it could produce an alternate system. About six months after that, GE had "shown together" and spent equal work developed around modified B-47 turret components and delivered a few tests at Eglin Field on a B-47—both generally satisfactory results.

■ GE System—Shortly after GE was awarded a small production contract for the turrets. In October, 1951, the Air Materiel Command canceled the Emerson program and opted the GE production contract.

Several of the production prototype B-47 GE armament systems have been delivered and deliveries are scheduled soon for installation in the production airplanes.

Approximately 516 turrets has been paid to Emerson, including over half of a \$10 million contract for installation, USAF reports. Most half of the USAF cost through the contracts has not been delivered.

Thanks that last Emerson report regarded as typical of their new long encountered by the electronics industry in attempting to develop the extremely complex equipment required for flying aircraft in the short time allotted before the aircraft was scheduled to go into service. Many of these problems are expected to be looked over at the meeting of electronic industry representatives scheduled for Sept. 9 in the Pentagon under auspices of the Munitions Board. Many problems posed by the fiscal 1952 and 1953 military aviation programs are on the agenda.



CONVAIR V-60 SPREADS ITS WINGS

Covair V-60 night jet carrying bomber, which recently was canceled out of USAF's critical stability problem of remote turret fire over strikes than local control turrets.

## AF Okays Cubs

- Light trainer advocates win an important round.
- Piper to deliver planes to nine flight schools.

Problems last week was a round in the long-running battle over military training airplane concepts when a million-dollar order for Cub-type tandem trainers for USAF cadet training was awarded by Piper Aircraft Corp., Rock Haver, Pa.

Lightplane training advocates long have contended that beginner pilots get off to a better start in simple, easy-to-fly aircraft, rather than the heavier, more complicated military trainers. Obviously, too, they are more economical in first cost and upkeep.

Last week USAF announced approval of plans for nine civilian flight schools holding Air Force primary training contracts to pool resources to buy up to 270 Piper PA-18 tandem trainers, powered by 90-hp Continental engines, at an estimated \$918,000. Deliveries are to start in February.

■ War Experience—The new training philosophy calls for fledgling Air Force pilots to take 25 hr flight training in the Cubs in a six-week training course before stepping into the 400-hp T-6 Hawk, post-World War II pilot trainers have started in the T-6.

During the war, repeated efforts to get lightplanes into the military training picture finally resulted in the war-

training service program, under which flying credit certificates could be earned in Cub-type trainers before going on to heavier craft.

Only modifications from the civilian PA-18 needed to be made will be the addition of toe brakes and installation of military bucket seats for gunnery.

Planes will be painted yellow. ■ GE the Shift—The civilian PA-18 trainer has a 100 mph cruising speed, 45 mph, and speed 710 ft/min rate of climb, 112 mph, top speed and 15,750 ft service ceiling. Empty weight is 800 lb, gross weight 1,300.

The off-the-shelf purchase by the schools themselves is expected to save many months and millions contained in a standard Air Force procurement of a similar plane.

## Aussie Vampire Output Delayed

(McGraw-Hill World News)

Melbourne—Fast DBI Vampire jet trainers are not expected to be delivered from the Eric's Industries. Sydney, about only next year. BAAP and the Australian navy had 24 and five, respectively, on order. To speed the delivery schedule, designers are being recruited from England.

De Havilland's Australian plant has orders for at least 25 of its three-engine Duster light transport. Trans-Australia Airlines has bought six, Qantas seven, Department of Civil Aviation two, at least three are being built to meet eventually in Australia's "living doctrine" service.



SAVAGE PHOTOGRAPHY SPECIALIST

North American A-1F, in production at Cambridge, Ohio, carries a well-placed movement of cameras for different types of aerial photo reconnaissance mission. This model of the Savage can be distinguished from other versions by its odd-shaped nose.

The plane is powered by two wing-mounted P-1W 2200-hp piston engines and an Allison PB in the fuselage can be seen by the hood mounted under the tail, the A-1F is designed to operate in a cross-hatched plane.

giant bomber's design was derived from the B-36. Strong under the wings, two to a pod, at the plane's 50,000 lb thrust—Covair V-77 jet engine—pushes and four jets.

The two prototype TB-60s ordered are expected to be used in gathering data on high-altitude operation of jet engines and assessing other experimental projects.







battle-damaged C-54 coming in to a miserable landing with the help of personnel chutes strung out behind it.

World War II gliders were equipped with chutes for landing, and Gerdien use of such chutes during the war is also recorded.

## AMC Moves More Activities to Bases

Dayton, O.—Air Materiel Command has released a schedule of additional procurement activities to be devised, initiated and established at Air Force bases located throughout the United States.

Seventeen classes and sub-classes are provided in the new chart, which supersedes the last compilation (A-11-1000 WHEE Aug. 4, p. 204).

Details of the program were announced by AMC in April.

New bases of acquisition, effective dates and property classes which are involved:

- **Midway AFB, Memphis, Tenn.**, Sept. 15, Class 66, live animals, Class 69, animal equipment and supplies, and Class 28, special purpose synthetic training aids for ground and airborne instruction.

- **Roberts AFB, Warner Robins, Ga.**, Oct. 15, Class 171, electronic and electronic material, and Class 35, intelligence, navigation computing, optical instruments, related equipment and maintenance parts.

- **Wichita AFB, Shreve, O.**, Oct. 15, Class 15A, flying field and hangar equipment, Class 19C, non-powered aircraft landing equipment, and 19E, maintenance parts for the above sub-classes.

- **Hill AFB, Ogden, Utah**, Aug. 15, Class 26, aerial equipment for ground extraterrestrial purposes.

- **McClellan AFB, Sacramento, Calif.**, Sept. 1, Class 13A, printing, offset reproduction, binding aviation equipment and maintenance parts.

- **Cadiz AFB, Cadiz, Ala.**, Aug. 15, Class 74A, air conditioning, refrigerating equipment, accessories and spare parts, Class 74B, heating, ventilation, plumbing, steamfittings equipment, accessories and maintenance parts, and Class 47 building materials.

- **Kelly AFB, San Antonio, Tex.**, Aug. 15, Class 79C, explosive and warfare materiel, special purpose, handling equipment, decontaminating equipment and related containers.

- **Olmsted AFB, Middletown, O.**, Sept. 15, Class 06A, aircraft engine parts and aircraft engine lubricating oils, Class 06B, lubricants, accessories, maintenance compounds, fuel containers and related equipment and maintenance parts.



## F-89D Displays New Fire Power

First official details of the wingtip armament in Northrop's F-89D Scorpion have been released by the Air Force.

The twin-jet interceptor in production at the Hawthorne, Calif., plant of Northrop Aircraft, Inc., carries two batteries of 275-in. air-to-air rockets in wingtip pods.

(Earlier story on the arrangement was in Aviation Week Dec. 3, 1951, p. 15. First photo of the pod was in Aviation Week Aug. 4, p. 70.)

Northrop says the use of rockets, replacing the former armament of 20-mm. cannon, contrasts to make

the Scorpion the country's most heavily armed fighter.

Behind the rocket's punch is advanced armament equipment which aims and automatically triggers the Scorpion's missiles.

Northrop engineers say the wingtip location of the rocket packages paid weight dividends. Larger numbers of the rockets can be carried (up to 100, say some observers), then exhaust blast does not engulf the fuselage at the critical moment of interception. And no gun air intakes are not exposed to the exhaust gases and debris which are a result of firing.

**VISIBILITY by Swedlow in the F-94C Starfire**

...the Lockheed F-94C fighter interceptor, the Lockheed F-94C Starfire, rises with phenomenal speed to the 45,000 foot bomber attack level.

By all electronic radar equipment enables it to lock into target, close, and fire with devastating effect. The perfect optical properties of its Swedlow-made weapon enclosures help to make the F-94C a day or night fighting instrument of infinite precision to protect our country from attack by enemy bombers.

**Swedlow PLASTICS CO.**

LOS ANGELES, CALIFORNIA • YOUNGSTOWN, OHIO



## SILASTIC® WORKS...Where Ordinary Rubber Fails!

THESE far set short all valves for jet planes must give positive control of hot air used for such vital functions as defrosting, anti-icing and the regulation of cabin air temperature and pressure. Silastic G rings withstand 3000 cycles of 500°F. plus 2000 cycles at 600°F. plus 100 cycles at 700°F. before life-tests were discontinued.

At temperatures ranging from -100 to over 500°F., Silastic shows extraordinary resistance to compression set or to permanent deformation between temperatures, shock and vibration, hot air, oxidation, ozone, outdoor weathering and the severe passage of time have little or no effect on the properties of Silastic.

Silastic is, therefore, the best resilient gasketing material available for hun-

dreds of applications ranging from seals for domestic steam traps to G-rings and glands for cylinder liners, water ports and oil pans in diesel-electric locomotives. And Silastic G Tops is the only resilient mounting top that will withstand Class H temperatures in electric motors, transformers and coils.

That's why design and production engineers specify Silastic for applications where other resilient materials are subject to rapid failure. They've found that, among rubberlike materials, nothing compares with Silastic for reliability, long life and low maintenance costs under tough service conditions.

ATLANTA  
CHICAGO  
CINCINNATI  
DALLAS  
NEW YORK  
LOS ANGELES

NEW CORNING  
SILICONES

HIGHLAND, MICHIGAN  
WASHINGTON D.C.

In Canada: Plinydon Canada, Ltd. Toronto  
In England: Adkins Silastics (UK), London

CORNING CORPORATION

FOR COMPLETE INFORMATION,  
ask for material info.,  
or send this coupon TODAY!

OW CORNING CORPORATION  
Box No. 0-20, Midland Avenue  
Shelton Park, N.Y. 10  
on properties and performance  
of Silastic Rubber  
Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

## PRODUCTION ENGINEERING



**BEFORE:** Original aluminum alloy wing joint of F9F-2 showing 45-degree complexity.



**AFTER:** Same joint is magnesium alloy, showing simpler 45-degree profile.

## Magnesium: Neglected Plane Material

Many advantages seen for this low-density metal in primary structures; being tried for F9F-2 wing.

By H. SPENCER PETERSON\*

The use of magnesium as a primary structural material for aircraft has been presented in an increasingly slow pace in this country. Because of the many advantages offered by magnesium it is not passing that more widespread engineering effort has not been expended toward its more general use.

Considerable magnesium poundage is used in certain production aircraft of heavily aluminum alloy structural design. In these cases magnesium is used as a secondary, nonload-bearing part for weight saving. But more important advantages can be gained by using magnesium as a primary structural material.

**F-80 Experience**—Under contract to the Navy Bureau of Aeronautics, East Coast Associates, Inc., a subsidiary of Bureau Steel Corp., took on a design development program to base on a previous, aircraft structure-F9F-2 wing joint—fabrication of economically available, lightweight magnesium alloy. Purpose was to exploit fully the structural advantages offered by the lower density of these alloys in comparison with the aluminum alloys now used.

ECA had previous experience in this field, having engineered and built two sets of thick skin F-80 magnesium wings under contract to the Stevens Branch, Wright Air Development Center (War Service Week July 4, 1949, p. 36). The

company also is now engaged in the design and construction of a complete F-80 plane in magnesium, also for the Stevens Branch.

**Objectives**—One of the major project was to prove that:

- Non-strategic magnesium alloys are completely satisfactory as a base material for aircraft fabrication, thus drastically reducing the dependency upon the highly critical supply of aluminum producing only in time of national emergency.
- Lower density of magnesium alloys will permit the design of a rigid, non-bulking type of wing structure (thick, extruded skin instead of conventional reinforced thin skin type now being used in aluminum alloy).
- Increased load-carrying efficiency is achieved in a wing structure free of surface buckling throughout practically all operating conditions.
- Simplification of design can be obtained, giving increased production through reduction in overall number of detail parts and fastenings, and through elimination of costly fabrication procedures.

- Cost of design and fabrication can be reduced in a direct ratio of design simplification.
- Strength-weight ratio equals that of the conventional aluminum alloy wing.
- Common production methods in currently practiced for magnesium alloy structures are adequate for Navy service conditions.

- **Patent Program**—Under the Navy

program, is utilizing as a prototype the wing the Grumman F9F-2 Panther, exact comparative data could be obtained to establish feasibility and advantages of using magnesium alloy and thus enabled design of the structure of a variable aircraft.

ECA engineers considered the F9F-2 wing joint a more difficult design and production problem for transition in magnesium than was the F-80 joint because of the deep root involved and the greater degree of member-to-member connection into the structure to cope with the rigors encountered in cross stress.

**Design Phase**—In the first phase of the program, ECA designed and constructed one static test wing panel, which was successfully tested at the Naval Air Materiel Center, Philadelphia. The panel withstood 1575% of limit load in the critical positive low angle of attack (PLAA) condition without failure, and showed an increase in torsional stiffness of approximately 31% over the aluminum alloy wing used. No member of the test wing was cracked until 117% of limit load in the PLAA condition was reached.

Tests of both a magnesium alloy and aluminum alloy panel for the PLAA condition were conducted to help establish beyond design ultimate (123% and 117%, respectively) without failure, and since the weight of the two panels are approximately the same, there appears to be no practical difference in strength might use.

Second phase of the development program provides for the construction of ten sets of service test panels, including additional engineering required



## strain gage



**S**train measurement is simplified with the Model SG-3 uncoiled resistance wire Strain Gage. It can be used repeatedly without disconnection and is ready for immediate operation upon engaging its knife edge contacts to the specimen. Two active bridge arms are employed. The gage factor of approximately 3.0 permits operation with conventional existing resistance Strain Gage equipment. Two sets of knife edges provide strain measurement ranges of  $\pm 0.003$  and  $\pm 0.015$  in./in.



Please write for Engineering Department for data



**Statham**  
LABORATORIES

San Jose, Calif. • Los Angeles 44, Calif.



**MOVABLE** beam, fabricated by East Coast Aeronautics in magnesium alloy, is all members of D-shaped wing nose assembly.



**FIXED** beam, which is one of components of drop nose, is the forward member of nose panel assembly.



**INTERMEDIATE** beam, forward end of this structure carries wingfield cylinder fitting



**OPEN** position of leading edge and fixed beam assembly subjected to magnetics



**CLOSED** position of leading edge and fixed beam assembly made by East Coast Aeronautics.



**PARTIAL** assembly of Cessna P182 nose wing panel with wing field (arrows).



**COMPLETE** wing panel (lower surface). At right are three rocket jacks and a bomb rack.

for installation of various operational systems within the wing.

Third (final) phase relating to service test.

► **Structural Details.** The P182's wing center section (integrated with the fuselage) extends 63 in. each side of the airplane centerline. Outer panels extend from this 63-in. point to 185 in. from the centerline.

The second panel structure consists of five beam-actuator, fixed, main, intermediate, and nose beam. The movable and fixed beams are separated for articulation of the drop nose and are connected at the lower wing surface by a main hinge running the full length of the span. The movable beam is the aft member of the D-shaped nose assembly, the fixed beam the forward member of the main panel assembly.

► **Beam Data.** The main beam runs vertically in a vertical plane perpendicular to the aircraft centerline at 27½ wing chord. It is the primary load-carrying member of the structure. Loads due to shear and bending are carried

from the beam to the center section through two SAE 4340 steel fittings bolted to more than 170,000 psi. The upper fitting is a hinge fitting for rotation in wing folding. The fittings are attached to the main beam with 4, 3 and 4 in. standard (NAS) high-strength bolts.

Main beam structure has capstrips machined from 2K-60 magnesium alloy extrusions, a web and doubler of PS-1H magnesium alloy sheet, and vertical angle stiffeners.

Intermediate beam runs spanwise at 45½ wing chord. Capstrips are 2K-60 extruded T-sections providing backing for a specific skin panel in both the upper and lower surfaces. The PS-1H magnesium sheet web and angle stiffeners complete the beam beam structure. One side of the wing fold cylinder support is attached to the forward end of the intermediate beam.

Nose beam is of extruded web and capstrip construction, the caps also being machined 2K-60 extruded angles. To the forward end is bolted the nose

beam hinge fitting for nose point of rotation of wingfield actuator. The T53T aluminum alloy fitting is bolted to the forward end of the upper capstrip and is supported by a machined 756T strut running to the lower capstrip. The assembly transmits the wing loads due to drag and torsion into the center section. Two machined 145T aluminum alloy hinges are mounted on the rear beam for wing flap support.

The top skin extends about 4 in. aft of the rear beam in the skin area. Aileron piano hinges are attached to the underside of the trailing edge of this skin, in turn supported by the fuselage skin running diagonally down to the rear face of the rear beam.

►  **ribs.** These are of two types: integrally cast, and built up units of magnesium sheet and extrusions.

All nose ribs are cast magnesium, as well as the top ribs and ribs of the skin ribs between fixed and main beams. The casting alloy conforms to Spec. AN-M-36 composition A, condition HHTA. Raw castings are reinforced







make them equal in, or better than, the original aluminum alloy product.

However, it is emphasized that damage of protective coatings on any metal structure will provide an opportunity for corrosion to start. This damage might be caused by scratching or abrasion of the surface in handling, by improper use of both during maintenance or by contact with liquids such as certain hydraulic fluids which may have a deleterious effect on the finish.

► **Procedure**—Although the original structural design was accomplished under a contract calling for the fabrication of only one static test panel,

productivity was always considered throughout the engineering design.

► **The numerous lightweighting measures** outlined were used throughout the structure to eliminate every small detail parts and fastenings.

► **The fixed skin structure** allowed the elimination of practically all spousal structure.

► **In general, the number of parts** was reduced by 41% and the number of fastenings by 42% relative to the original aluminum panel.

The static test wing was built using these same features—except for some assembly, another for skin beam assembly,

and one assembly jig for the panel without the nose. Only such lifting as was required for sections were performed.

Considerable difficulty was encountered in joining the leading edge assembly to the main panel, due chiefly to small distortions in the square section caused during casting. This difficulty was overcome as the production program by first joining the fixed and movable beams with the hinge pin, then attaching the leading edge to the movable beam and finally, joining this assembly to the panel in the new final assembly jig.

► **New Tools**—Although the limited production order for two sets of panels did not warrant a full-scale tooling program, sufficiently complete tooling and jigs were used to provide economical production and control of the necessary features of interchangeability. The features used for construction of the static test panel were for the left hand only and were found to be inadequate for expedient production.

Therefore, new jigs were designed and built for the static panel—each of the five beams, the leading edge and panel assemblies. A jig master was obtained through the Better Representation, Bethesda, N. Y., with which the three main panel interchange parts were located in the assembly jig. This was done to insure interchange of the panels in the entire section and proper fitting and locking action.

A complete lifting program was also considered in which all detail parts were developed, and templates made for their fabrication and inspection.

For routine, rolling and housing of the thick magnesium skin, machining of openings, cast ribs and various other parts, routing and drilling of webs and doublers, and forming and drilling of nearly all detail parts were controlled by coordinated templates of every type.

An efficient detailed production and material control system was exhibited at the beginning of the two-wing project.

► **Flight Test**—The first production set of panels was certified on a full-scale F-102 (manufactured by BeAer in December, 1957). Wing change-over was accomplished at Floyd Bennett Field by ECA personnel and the work was approved by Naval Inspection.

The plane was flown in Naval Air Test Center, Patuxent River, Md., where the demonstration consisted of three maneuvers prescribed as Navy spec 50-112, which would in any way affect the wing structure.

Maneuvers included TIIAA (positive high angle of attack) and PLAA pull-outs, maximum pullout, high- and low-speed rolling maneuvers, speed reduction and abrupt climb with high and low speeds. Most of these flights

were accomplished with and without full exposed skin loading. In all cases the flight load envelope points attained by the original airplane were equalled or exceeded. Generally higher rates of roll in the abrupt climb roll tests were obtained with the new wing design, which is a direct and important result of the additional torsional stiffness. This property would be particularly advantageous in a swept-wing design where very high torsional loads are developed.

The demonstration required 15 flights and was completed in 30 days despite weather and maintenance delays. Catastrophic handling and structural loading tests also have been completed.

► **Severe Trials**—Final phase of the development will be BeAer's service test in which the two wing panel sets will be installed on F-102s and put in operational status with groups of standard F-102s. Then, under the same operational conditions of maintenance, weather and flight usage, a comparative evaluation of ruggedness, ease of maintenance, conversion-overhead and general flight performance can be obtained.

► **Better from Scratch**—The objectives of the program have been essentially achieved. On the basis of experience gained in this and previous projects, ECA engineers are thoroughly convinced that magnesium alloys are completely satisfactory as a primary structural material for airplanes. Advantages realized have been considerable, even though expanding work was handicapped by the fact that redesign of an existing structure was required.

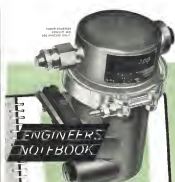
It is strongly felt that even greater advantages could be gained by designing an aircraft structure in magnesium "from scratch." Consideration of interchangeability of wing skins, skins, liquids, and internal systems which were involved in this airplane project could be better controlled in an integral magnesium design.

## USAF CONTRACTS

Following is a list of recent USAF contracts awarded by Air Materiel Command.

**Northrop Aircraft Inc., Northrop Plant, Hawthorne, Calif.** contract 100-400, **Northrop Corp., Fort Worth, Ohio** contract 100-400, **Northrop Corp., Fort Worth, Ohio** contract 100-400, **Northrop Corp., Fort Worth, Ohio** contract 100-400, **Northrop Corp., Fort Worth, Ohio** contract 100-400.

**Northrop Aircraft Inc., Northrop Plant, Hawthorne, Calif.** contract 100-400, **Northrop Corp., Fort Worth, Ohio** contract 100-400, **Northrop Corp., Fort Worth, Ohio** contract 100-400, **Northrop Corp., Fort Worth, Ohio** contract 100-400.



## Coupling Provides Easy Cleaning Feature on Oil Separator

The Genie Oil Separator for recovery of all in excess, efficient systems employs a standard Marmar V-Band Coupling between upper and lower sections. A patented Quick Coupler Lock allows instantaneous disassembly of the unit for easy cleaning and provides a long-lived seal which has been tested at 50 p.s.i. in steady state conditions at all conditions of temperature and vibration found in transport service.

The Marmar V-Band Coupling is a standard design with all the advantages of low cost, quick delivery and easy specification. Its versatility enables it to accommodate many different and widely specified applications. These features make it a valuable addition to any equipment which requires a clean, dry, and safe means of the U.S.A.

FOR ADDITIONAL INFORMATION, WRITE FOR ENGINEERING INFORMATION CARD

**MARMAR PRODUCTS CO., INC.**

1741 E. 17TH AVENUE, DENVER, CO. 80202

LOS ANGELES, CALIF.

# YOU CAN'T TEAR THIS FEATHERWEIGHT COATED FABRIC

**...it's VULCAN "COVERLIGHT"**

Here's what you have been waiting for — a new and revolutionary lightweight coated fabric for scores of industrial applications.

Vulcan's newly developed "COVERLIGHT" combines extremely light weights (only 5½ ounces per square yard) with exceptionally high resistance to tearing. Tensile strength also is unusually high.

"COVERLIGHT" is especially useful in aircraft and aviation applications, such as wing covers, engine covers, tail surface covers, baggage compartments, covered surface seals, etc. It is used in a protective covering for any kind of machinery, automotive equipment, light weight carrying cases, protective covering for sports fields, etc.

"COVERLIGHT" is a nylon fabric, coated with synthetic rubber. Get your sample of this "featherweight" waterproof fabric that is so tough you can't tear it. Also available in 60, 36, 12 and 14 ounce per square yard. Write for complete specifications and samples.

**VULCAN RUBBER PRODUCTS, INC.**

50TH STREET AND FIRST AVENUE, BROOKLYN 22, N. Y.



- ... accurate liquid control
- ... eliminates switch failures

This compact and light precision instrument meets unheard of space and weight limitations and presents a new standard of safety and accuracy in liquid levels of high, low or constant levels. The hermetically sealed, magnetically operated switch minimizes false alarms or chronic caused by agitated liquids and vibrations. . . . The Reverse Limit Level Limit Switch is unaffected by high altitudes . . . unaffected by overvoltages . . . no springs to become damaged. More than 20 different types are being used now in the Aviation Industry.



**REVERE CORPORATION OF AMERICA**  
WALLINGFORD 2, CONNECTICUT, U.S.A.  
weather proofing instrument for aircraft and industry

[illegible]

The Pioneer Builder of  
Transport Helicopters  
*offers*  
**UNUSUAL  
OPPORTUNITIES**  
*for*

**ENGINEERING**  
Designers & Draftsmen

with aircraft experience on  
Avionics, Controls, Electrical  
and Power Plant Installation.

**ENGINEERS** for  
Flight Test, Instrumentation  
and Structural Test

**Also CHIEF of  
Experimental Flight Test**

... a degree in engineering with further knowledge of aircraft instrumentation, vibration, power plant and aerodynamics of helicopters. 5 to 8 years' experience in flight test engineering, 2 of which should be in flight testing helicopters. Experience as a helicopter pilot highly desirable but not mandatory.

## INDUSTRIAL ENGINEERS

Industrial engineering degree or the equivalent plus 3 to 5 years' experience desired.

Send complete resume to: Employment Office

**PIASECKI**  
Helicopter Corp.

A Philadelphia Suburb  
Near Swarthmore

Lord Mountings protect the service life of vital aircraft parts and improve the overall operation of aircraft. From engines to components, Lord Mountings contribute a full measure of dependability.

Here are but a few examples of Lord Meetings which may help you on present or future designs.

1. Dynaloc Engine Suspenders
2. Instrument Panel Mountings
3. Communication Equipment Mountings
4. Engine Generator Mountings  
(For Flying Boats, see Ground Supply I)
5. Photographic Equipment Mountings
6. Air Conditioning Equipment Mountings
7. Control Mountings
8. Oil Cooler Mountings
9. Pilot Seat Mountings
10. V. H. F. Antenna Mountings
11. Junction Box Mountings
12. Actuator Attachment Mountings

Take advantage of our experienced, specialized vibration control lab more than a quarter century.

[46] National Aeronautics and Space Administration, *Handbook of Spacecraft Engineering*, 2nd ed., McGraw-Hill, New York, 1970.

LORD MANUFACTURING COMPANY • BLUE PA.

HEADQUARTERS  
FOR  
VIBRATION CONTROL





PROFILES TURNING over marks start of accelerated Britania flight program.

## Britannia Races SBAC Deadline

Britannia rushes to ready turboprop airliner prototype for Farnborough show, where it may mean delays.

With a present goal of profile and a future almost of dollars sales, technicians of the Bristol Aeroplane Co. are working against an impending deadline in the post-assembly hall at Filton, England.

Their job is to complete the prototype Bristol Britannia, four-engine turboprop transport, soon enough for it to take up the required ten hours of flight time before the SBAC Farnborough display, which runs from September 1 through 7.

If they succeed—and Bristol says the plane has begun its testing—foreign interest in the big craft will qualify. There is considerable feeling here and abroad that the Britannia will be the plane to beat on the North Atlantic. This could mean sales for competitive airlines—beyond the 15 or more for British Overseas Airways Corp. Progress Report—In March this year the plane had just entered final assembly, mated wing panels were attached to the forward fuselage (AVIATION WEEK, Mar. 24, p. 23).

A few weeks ago the big turboprop took off from Filton on its maiden flight and the company began wing against a tight schedule to get in the necessary ten hours of flight time required before it can enter the top-notch exhibition, attended by potential customers from all over the world.

With only days remaining before the Farnborough show, Bristol will have to

get cracking "to meet the deadline."

With the first prototype out on the flight ramp, the second has entered the assembly pits and is now about to enter the test cell on the test March.

Structural Progress—Major structural tests on the Britannia mark the largest program the company has undertaken. A complete wing, a full-scale main fuselage mounted on stub wings and a full-scale front fuselage were subjected to loading.

Critical loads for the wing structure



MAIN LANDING GEAR of Britannia is critical in mockup for endurance tests.

were prepared for loading and gust conditions. Landing was expected to be critical for shear and tension, and gust conditions were expected to worry most of the loading structure.

With only one specimen to test, Bristol decided to apply post-loading one load (equal to 66 2/3% of ultimate load) to show that no permanent deformation would result. These ultimate gust loads would be applied to demonstrate that the wing would take the 100% condition.

The specimen was a complete wing with only the wing tips missing. All of the primary structure was reproduced. Landing and trailing edges were mounted for the loading tests; they were added—onboard of the main spines—for the gust case. Control surfaces were not needed.

Correct and conditions were simulated with a 46-ft length fuselage.

Test Focus—The Bristol engineers concluded three basic types of test frames for the structural proof program.

• **Aluminum**, with loads applied and measured by one set of hydraulic jacks. This system was discarded because of the long stroke required for some of the tests, with weight defects under ultimate gust loads requiring 7 ft.

• **Measurement**, with loads applied and measured acoustically. This was abandoned because of the difficulty in measuring large loads with sufficient accuracy. It was also considered essential to have load and deflection indicators brought into a control control room, along with controls for load application, and this also had bearing on the rejection of the system.

• **Mechanical-hydraulic**, with mechanical load application and hydraulic measurement of loads and deflection. This method was selected for the Britannia tests.

This third test apparatus is similar to



NOSE WHEEL of the Britannia is shown here installed in structural mockup.

# Do you know THESE NEW FACTS about G-E Silicone Rubber?

**E**VER use silicone rubber in the design of parts or equipment?

If you have, you'll be interested in some new facts regarding this remarkable material. And if you haven't used or specified silicone rubber before, these new discoveries may suggest how you could take advantage of its unusual properties in your business.

## COSTS GREATLY REDUCED

New types of silicone rubber, developed by General Electric, are **THREE TIMES AS STRONG** as early varieties. Yet this new

rubber actually costs much less. Its amazing heat- and cold-resistant properties have made it ideal for applications where no other rubber could meet specifications.

## WHERE CAN YOU USE IT?

If you haven't investigated G-E silicone rubber lately, you'll want to get the facts about these important new developments. A booklet describing some of the uses and outlining the characteristics of this amazing material has just been printed. We'll be glad to send you a copy, free. Just use the coupon.



General Electric Company  
Section 133-28  
Mansfield, New York

Please send me, free, your new booklet, "Imagining with Silicone Rubber." I am principally interested in:

- ☐ Silicone seals ☐ gaskets ☐ boots
- ☐ Silicone rubber mechanical wire
- ☐ Silicone tubing
- ☐ Silicone hose and ducting
- ☐ Silicone rubber tapes and sheets

Name

Address

City  Zone  State

G-E SILICONES FIT INTO YOUR FUTURE

GENERAL  ELECTRIC



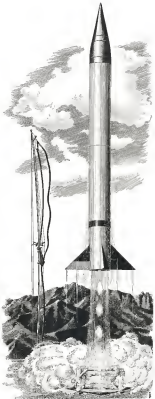
## Research Rides a Rocket

The Naval Research Laboratory's Viking rocket research at White Sands Proving Grounds, N. M., hunts facts, figures and formulas in the upper atmosphere.

**H**YPERBOLIC as the blue, Naval Research Laboratory rocket asks questions of the earth's atmosphere... But back the answers needed to grasp the dangers of tomorrow's polluted sky, global climate change, the perils of war. What are the prospects for the temperature of the earth's atmosphere? Is the high-stride change in the earth's magnetic field affecting navigational instruments (the alterations in radio waves caused by the ionosphere... the effects of an ion space on communication equipment out beyond the blurring effects of the earth's heavy atmosphere)?

Martin Viking rockets play a major role in this high-altitude flight research program. Last summer, the Viking cracked the world's altitude record for single-stage rockets — rising 136 miles into the heavens at a top speed of 4,100 mph. Now, an even more powerful Viking is being readied for launching. The Martin Company is proud to be a partner with the Naval Research Laboratory in these vital activities — all helping to prove that America's most vital life-saving weapon is its scientific leadership! The GLENN L. MARTIN COMPANY, Baltimore 2, Md.

**Martin**  
AIRCRAFT  
Builder of Dependability Since 1911

[illegible]

WEIGHT DEFLECTIONS of about 7-in. are readily demonstrated in the creep rate photograph. These deflections represent extreme loading conditions to the point of structural failure. First design failed at 96% loads, bearing in small area will raise value to 100%.

the "cathedral" test (now used at the Royal Aircraft Establishment). Basically it is a reinforced concrete slab with an internal steel portal frame which can be moved around within the limits of the slab.

Each panel from carries a mechanical unit for straining the structure under test. The straining unit is a horizontal pivoted beam on which are mounted two worm-driven straining screws, a force-grip gripper and an electric motor.

The floating end of the pivot beam rests on a hydraulic compression jack, connecting to a strain transducer for load measurement. Lower ends of the straining screws are connected to the test specimens through a series of "Christmas tree" loading beams.

**• Loading Conditions:** For the loading condition, all vertical loads were applied by two straining units, one on each wing. These simulated main landing gear reactions, inner and outer engine nacelles and an additional vertical up load on the rear spar to produce proper toe-up shear stress in the critical region. A separate hydraulic apparatus applied the drag and side loads of the main landing gear.

For fast loading, all six frames were used to apply distributed uploads—spanning the entire deck width—to the full span. Some downloads were also applied by a separate hydraulic system to produce proper beam conditions on the west.

the package was returned to the

working value of 5.3 psi. to get correct break and near rest frame conditions.

**• Test Results**—Initial tests in the loading condition showed that some modifications were needed for the fastlane, because the loads were too high in the fastlane and were considered not representative. The sacriles also required some modification.

With these changes made, the structure was loaded to proof, and some of the sway called for permanent adjustments on land occurred.

For gust tests, the specimen was tested by hand. Under 99% of the design loading it appeared satisfactory, but failure occurred at 98% loads. Royal Aircraft Establishment and Bristol Universities concluded that previous failure was in the front spar, carbon

Reinforced tape that retains its small residual strength (those will bring the strength of the wing to 100%). Remainder of the damage to the test wing was considered remainder and caused by one of the

"low weakness" of the post-revolutionary era in which the wing deflection is held by the rearward streamer axis.

• **Anti-icing** – The Britanica uses thermal anti-icing for the wing leading edge. Final testing of the complete system will wait for flight. In the meantime Bristol is getting preliminary information and regulator settings with the equivalent cold air flow pattern in a wind tunnel.

This ground will represent only a portion of the system and will be ex-

A centrifugal fan simulates the delivery of air to the turbine. The air flows through ductwork, compressors and out, there are flow regulators at the exits to control the distribution for test conditions.

Three- and four-engine flight was simulated to pick up any differences in flow, but no structural change was noticeable.

• **Non-Flying Prototype**—Brinell's functional model of the interface has been fitted with some and some landing gear, and the collection tests have begun.

Part of the test routine calls for 1,000 cycles of stretching and extension to check operation of output tubes, warning lights, pressure gauges, control valves and switches and to determine the wear on rubber rings and seals.

During these tests, the emulsifier systems are operated at regular intervals. There are two such systems, one actuated by a motor-driven pump and the other using a hand pump.

Each time the gear is lowered, the brakes are applied to check the consistency, hydraulic system and condition.

-1149

### Light Canopy Seal Pressure Regulator

The smallest and lightest canopy set pressure regulator set built is the class made by Necessary Products Co. for its own design.

Designed to reduce the size and weight of pressure regulation for fighter aircraft crews, scaling, the unit now is being produced for the North American F-106F and the McDonnell F-15.

The regulator is a two-point test, comparing functions that internally compare two values. The output shows the new regulator is lighter than either one of the values previously needed.

For North American and McDonnell the regulator is preset at 30 psi, plus or minus 2 psi. The designer may outfit pressure can be set from 10 to 50 psi, and inlet pressure up to 175 psi.

The unit functions as a demand regulator, utilizing a bellows operating a poppet valve. The regulator allows the pressurizing of 66 cu. in. volume in 20 seconds. In event of emergency, the pilot can flick a cockpit button which vents the regulator solenoid and allows the energy sent to exhaust in 14 seconds.

Designation is Canopy Soil Pressure  
Revelator, No. 100500

Accessory Projects Co., Whittier, Calif., makes the unit.









## EXPERIENCED FLIGHT TEST INSTRUMENTATION ENGINEERS

- FLIGHT TEST ENGINEERS
- FLIGHT TEST ANALYSTS

Dealing with

- GUIDED MISSILES
- AIRPLANE SYSTEMS
- AUTOPILOTS

The Missile and Control Equipment Laboratory of North American Aviation has openings in its flight test organization to handle flight testing of guided missiles and electronic control systems.

Excellent opportunities are offered for experienced engineers and analysts with airplane and guided missile flight test and flight test instrumentation background.

Outstanding opportunities are available on a long-range development program on basic guided missile work.

- SALARIES COMMENSURATE WITH TRAINING AND EXPERIENCE
- EXCELLENT WORKING CONDITIONS
- FINEST FACILITIES AND EQUIPMENT

Write now.

Give complete resume of education, background and experience.

## NORTH AMERICAN AVIATION, INC.

Engineering Personnel Department  
Missile and Control Equipment  
Laboratory

12214 LAKEWOOD BLVD.,  
DOWNEY, CALIFORNIA



**WHIRLER** at Navy's Aviation Medical Acceleration Lab is believed to be the world's largest centrifuge. It can produce forces as high as 40G. Test subject rides in the gondola-mounted gondola at the left.



**WHIRLER** sits in gondola ready for test spin. The gondola has variable pressure and temperature environment. Altitude pressure at 60,000 ft. can be simulated; temperature of 150F can be produced in the seat.



**OPERATOR** sits at control desk as Whirler suspended from ceiling (upper right corner of top photograph). Speed of the centrifuge can be regulated either from control panel or from within the whirling gondola.



Finally, working at North American provides hard challenge and plenty of room. Because North American always works in the future. Yet, if you are interested in advanced thinking, if you like to work on the planes that will make tomorrow's aviation history, if you like working at North American, North American offers these extra benefits, too.

- North American Extras—**
- Salary commensurate with ability and experience
  - Profit-sharing
  - Complete employee service program
  - Class of living allowances
  - Bus and bus stop
  - Private facilities and equipment
  - Excellent opportunities for advancement
  - Group insurance including dental plan
  - Stock plans
  - Transportation and moving allowances
  - Employee Credit Union
  - Education refund program
  - Low-cost group health (including family) and accident and life insurance
  - A company 24-hour dining

### Write Today

Please write to get complete information on career opportunities at North American. Include a summary of your education, background and experience.

**CHECK THESE OPPORTUNITIES at North American**

**Manufacturable**  
Stress Engineers  
Aircraft Designers and Draftsmen  
Specialists in all fields of aircraft engineering

**Recent engineering problems:**  
Engineers with skills adaptable to aircraft engineering

**NORTH AMERICAN  
AVIATION, INC.**  
Dept. 10, Engineering Personnel Office  
San Diego International Airport  
San Diego 46, Calif. California 16, City  
North American Fly Bell Airplane  
Then Also Other Company In The Field

cardinal function and cerebral metabolic rate. Radiological techniques will be brought into play to study changes in body tissues. Life changes in mind motion through the heart and lungs will be studied by X-ray cinefluorography and cinematography.

There will be studies to determine the effectiveness of external pressure suits—the G suit is one example of this science—and the problems of human engineering. Data also will be collected from centrifuge runs with solar and radio devices.

► The G-suit—known for the subject as an aluminum gondola in the shape of an olive spheroid, with angles of 10 deg and radius of 4 ft. It is suspended in double gimbal mounts with power-driven engines so that the gondola can be positioned and held in place during the test run. It can, for example, be whirled about and over- or under-rotated.

The gondola may be de-pressurized to simulate altitudes up to 60,000 ft. Test pressures range 40F to 150F can be obtained.

About the main chamber containing the centrifuge and its operating mechanism is a rotating gondola for control and the recording of data. Here are instruments which read the subject's pulse rate, blood pressure, heart and brain waves, and record his responses.

Within the gondola is a television camera feeding monitoring screens situated throughout the building for viewing, timing of the subject. High speed X-ray and motion picture cameras are also made with the ride.

► Project Development—Requirements for the centrifuge were established by the Navy's War and Oceanic Medical and Surgical in 1947. The Special Device Center of the Office of Naval Research was named responsible for providing the facility.

The mechanism was designed and constructed by McKinnon-Ten Corp. Power for the whirling comes from a large 4000 hp. d.c. vertical motor made by General Electric Co. This unit is capable of instantaneous starting in up to 34,500 hp. Electronic control mechanisms were also supplied by GE.

All major joints of the gondola and wheel are as built with E-24 steel. Nuts, including the shaft joint on the gondola. The structural integrity of this joint has to be guaranteed, not only because of strength requirements but also because of the pressure differential created when the gondola is evacuated to high simulated altitude.

When built for the centrifuge was designed by Navy's Bureau of Yards and Docks and built by Ralph S. Hume, Inc. It is a cylindrical reinforced concrete building 110 ft. in diameter. One side of the centrifuge is 100 ft. in diameter.

**Designers-  
producers of  
AIRCRAFT  
COMPONENTS**

**AN fittings**  
**Special fittings**  
**Flexible Metal Hose Assemblies**  
**Silicone Rubber Hose Assemblies**

We will be pleased to quote on all AN fittings and special aircraft components. Write or phone for further information.

**AIRCRAFT COMPONENTS  
DIVISION OF  
GUMPERT TAPPEL, INC.**

**MAIN OFFICE AND PLANT**  
415 N. Elm St., Tulsa, Okla.  
Tulsa 2, Okla.

**SALIS OFFICE**  
1111 Union St.,  
Tulsa, Okla.  
Tulsa 2, Okla.

**NEW YORK OFFICE**  
1111 Union St.,  
Tulsa, Okla.  
Tulsa 2, Okla.

**NEW YORK OFFICE**  
1111 Union St.,  
Tulsa, Okla.  
Tulsa 2, Okla.

**CPI  
FIRE DETECTOR  
AIRCRAFT TYPE**

**GLASS  
HERMETICALLY  
SEALED**

**CPI  
Detector  
No. 30A-4**

**COMFORMS TO  
C.A.B. 1-50 - 1-11  
F.A.S. 401  
U.S. NAVY  
S.S. 134A**

GLASS Encapsulated Steel elements like aluminum do not corrode and leaching. Absolute dependability proven by thousands of hours flight testing on simulating and jet engines. Write for catalog.

**CONTROL PRODUCTS - INC**  
365 NASSAU STREET • NEW YORK, N. Y.

**PRODUCTS AND MANUFACTURING  
OF THERMAL SYSTEMS**



Staffed and Toolled for

# HYDRAULIC ACTUATORS

TO **A-N** SPECIFICATIONS

Breeze has the engineering staff, the shop capacity and special test equipment to produce hydraulic actuators of all types.

All engineering work, from basic specifications to final design for production, can be handled for you.

High-capacity machine tools provide low unit costs. Special tools, such as honing machines, give finishes to the exact micro-inches required.

Breeze has all the test facilities for magnetic inspection, proof and bursting pressure tests, life cycles and other A-N standards.

**LONG EXPERIENCE** by Breeze with all types of actuators—jet, air, linear, electrical, mechanical and hydraulic—means that your actuator was engineered, produced, tested and delivered by a firm of specialists in the field.

If you have actuator problems that call for expert attention, call on Breeze for production.

**HYDRAULIC ACTUATORS**

**BREEZE CORPORATIONS, INC., 41 S. Sixth St., Newark, N. J.**



## HIGH COMPRESSION INLET

$M_0$  3.05



STEADY FLOW



PULSING FLOW

0° ANGLE OF ATTACK



STEADY FLOW



SEPARATED FLOW

10° ANGLE OF ATTACK

## Better Way to 'Gulp' Ramjet Air

The only job of a ramjet intake is to gulp the incoming air efficiently. There are a myriad of ways to do this with varying degrees of efficiency. But the method which produces the highest efficiency for a given flight Mach number is the continuous-compression type of inlet, gathered above under NACA tests at Mach 3.05.

This inlet, originally developed by engineers of General Electric Co.'s General Engineering and Consulting Laboratory, is the ultimate extrapolation of multi-shock diffusion inlets (powered in Germany by Klaus Obitzsch). Instead of using one, two or three inclined shocks of finite strength to raise the pressure of the incoming air, the continuous-compression inlet uses an infinite number of infinitesimally weak shocks to accomplish the pressure rise with minimum losses.

As a result, such an inlet can draw

pressure increases of two or three times those obtainable with normal shock diffusion (the general standard of comparison used for weighing test results).

Weakness—This type of inlet suffers, along with most inclined shock diffusers, from sensitivity to angle of attack. The lower part of sketches illustrate this, showing the representation of the normal shock and the flow spillage which accompanies it. Although the flow is steady in the left-hand picture, it is completely separated on the upper surface of the spike in the right-hand picture.

This inlet also is critical for off-design conditions. These tests apparently are below the design Mach number of the inlet, because in the upper left-hand picture flow spillage is evident and the flow does not lie along the surface of the spike. The right-hand upper picture shows the violent pulsations that

can occur with ramjet inlets, in such cases the flow slips back and forth from subsonic to supersonic on the sides of several times per second.

In spite of these critical design conditions, the continuous-compression type of inlet appears to offer the best efficiency for high speed, above 3.0. There also is promise that the sensitivity to angle of attack and supersonic flow can be reduced. With these problems solved, at least one component of the high-speed jet engine will be in good stead—BAA.

## Tooling Scopes Now Made in U.S.

Adoption of optical tooling by the U.S. aircraft industry is keeping wet new U.S. equipment for application of the system. Latest unit to be introduced here is a precision scope—Alpha Scope—made by Joel Fox Co., Inc., Los Angeles. Until now, only British-made Taylor, Taylor & Hobson, Ltd., scopes were available.

Employed in tooling to be parallel or at right angles to the line of sight and in the right-angle position can be rotated 360 deg. Mounting ball, integral with the barrel, has 3/16-in. diameter, same as the front lens.

Magnification is 5X, range 10 in. to infinity. Field is 51.4 in. 500 ft. or 50 minutes. Resolution is 2 sec. of arc. Range of measurements is ± 0.001 in. in horizontal and vertical displacement. Operating dial control and indicate displacement within 0.001 in.

Costs \$18 B. and will sell in Los Angeles for \$1,550. Company also has optical accessories such as the mount, bases, targets, optical systems and accessories.

Another U.S. manufacturer of optical tooling equipment is Farned Optical Co., Inc., Bronx, N. Y.

## Wright Field Seeks Aircraft Engineers

Wright-Patterson AFB Headquarters reports it is urgently in need of several specialized personnel.

These are the categories:

- **Aeronautical Engineering**, 68-31, 10-10 per year.
- **Qualification:** All degrees in engineering plus 10 years of professional engineering experience including at least six months in aircraft production and/or design.
- **Aircraft Development Control Engineer**, 68-31, 10-10 per year.
- **Qualification:** All degrees in engineering plus 10 years of professional engineering experience including at least six months work with experimental aerodynamic aircraft.
- **Aeronautical Powerplant Design Division Engineer**, 68-31, 10-10 per year.
- **Qualification:** All degrees in engineering plus 10 years of professional engineering experience including at least six months













thirteen inverse voltage is rated at 40 v. and average operating current at 10 ma. at 25C. Each diode has a peak inverse voltage rating equal to 125% of its continuous rating, peak operating current is about 100% of normal rating.

and surge current is about five times normal rating.  
Krytox, Burlington Co., 251 West 19 St., N. W. York 11, N. Y.

## Signal Generator For Navigation Aids

A completely portable signal generator which will check the operation of VHF omnirange receivers as well as those in phase type ILS localizers and glide slope receivers has been developed. The device can generate any desired omni-range bearing signal. Three different combinations of error pointer sizes

error signals can also be set up to check ILS receivers and indicators.  
The device operates from either 120-v. 60-cycle a.c. or from 28-v. d.c.  
American Electromech Corp., 5629 W. Jefferson Blvd., Los Angeles, Calif.

## 39900 FILTER CENTER 65688

► New HF Transceiver Development—Coflex Radio is announcing a 100 v. 14-element HF receiver-transmitter for phone and CW. Frequency range is 2 to 25 mc., with remote servomotor-tuned tuning to any one of 144 selected channels. Transceiver will use diode-modular type construction and be in one 14 A-TK rack, weight will be about 60 lb. External power supply will weigh about 17 lb.

► F-4 Fire Control System—North's Ohio Testbed facility is developing fire control system for North's new North American F-4. Current work includes flight tests on F-4s to find best place to mount angle-of-attack and angle-of-attack probes which provide information needed by fire control computer. (Rockets head off in direction of windstream instead of toward aiming point; hence computer must factor in the angle of attack and yaw.)

► New PB-Temp Rectifier—National Bureau of Standards has developed a titanium diode rectifier whose performance is said to improve with increased temperature, up to 150C. It consists of sheet of titanium metal coated with a thin layer of titanium dioxide which is lapped with a thin layer of another metal (molybdenum). NBS work is at present in the early developmental stages.

► MAC's Microwave Radar-M-Donnell Aircraft Co.'s new microwave lab is setting up to check radome transmissivity errors to an accuracy of 0.1 millidB. (This is equivalent to a radar warning error of one foot in two miles.) MAC thinks its measurement accuracy will be highest in the centimeter. Lab also investigates radar antenna radiation pattern using small aircraft models.

► Douglas Antipodol For F4D-Baker is reported to have given Douglas Aircraft Co. approval to design its own antipodol for F4D because its existing antipodol would fit F4D's special control configuration. System components will probably be packaged in odd shapes to fit them into space-constrained F4D. Douglas now firms out manufacture of production items to one or more avionics contractors.

► GE Instrument Standardization Pass GE-Av antenna standardization pro-

gram in its aircraft instrument design has enabled General Electric to cut prices on certain instruments by more than 20%, GE says. The company now makes only two different inch gauges, instead of the previous 182 different models. It standardizes inch dials to replace the previous 260 different models.

► New Jet Controls Lab—Mississippi Honeywell will speed development and test of its automatic controls for jet engines with a newly constructed lab which will use electronic analog computers to simulate actual engine performance. Computers will duplicate engine operation under idle, takeoff, cruise, or approach (final) (takeoff) conditions at any desired altitude or speed.

MHI expects the new lab to provide more test data on controlled engine control system performance and to cut research time. Lab will be housed in a separate building to be completed this summer. Building will include provisions for handling jet fuels used in test bed including portion of engine control.

► New Technical Bulletin for the Avionics Engineer

► Avionics type data for engine systems equipment are described in Manufacturing Co. Bulletin G12. The avionics type construction is said to be extremely efficient. Units are available with 25 v. d.c. in 60 and 400 cycle meter. (Bentley W. Oliver Bldg., Pittsburgh 22, Pa.)

► Four-channel carrier amplifier which generates 1-kc. carrier voltage for atom gauge and also amplifies and de-modulates tape signals for oscilloscope recording is described in Consolidated Engineering Corp. Bulletin CEC-1122A. (510 N. Sierra Madre Villa, Pasadena 8, Calif.)

► Electrical computer for signal selection of 20 to 25 in 12 simultaneous linear operations which can be used in electrical circuit study, aircraft better analysis and statistics is described in Consolidated Engineering Corp. Bulletin CEC-1182A. (510 N. Sierra Madre Villa, Pasadena 8, Calif.)

► Clapper amplifier designed to raise power level of microcoupler and diode gap signals for operation of recording device is described in Kollsman Instruments Bulletin. Designated the Model 506, the device will handle signal for frequency up to 500 cps. (1865 Carnegie Ave., Cleveland 15, Ohio)

► Low frequency, low distortion oscillator with continuously variable frequency between 0.24 and 100 cps is described in Sargent-Woodward Industrial Electronics Co. Bulletin. Device is designated Model LK. (P.O. Box 13496, Houston 19, Tex.)

# Incomparable

a pretty girl



## Incomparable

A "Elvis Beaulieu"  
150-Hour Inspection  
By Southwest Aviators



SOUTHWEST AIRCRAFT COMPANY  
MEMPHIS, TENNESSEE



*get*  
**FASTER SERVICE** on hardened, ground  
**ROLL-THREADED PARTS**



**OHIO ELECTRIC** can give you faster service on rods, bearings, inserts—in fact any type threaded part made to the highest precision tolerances. A large volume supplier to major jet engine and accessory manufacturers, Ohio is isolated and equipped to undertake experimental or quantity production of parts manufactured to "unlike." Reduce your lead time by turning your problems in precision hardened, ground roll-threaded parts over to Ohio Electric.

Ohio also makes lifting magnets and entirely different Aviators, drill and large metal—Revolving draw bars and seal making machines.

**THE OHIO ELECTRIC MFG. CO.**  
5011 MAXWELL AVENUE • CLEVELAND, OHIO







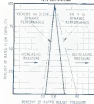
Vickers Model AA-50300-01  
AN 6276-0002



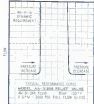
Vickers Model AA-50300-01  
AN 6276-0002



Vickers Model AA-50300-01  
AN 6276-0002



Pressure variation from cranking point to maximum rated capacity of Vickers Two-Port Balanced Piston Relief Valve is consistently less than permitted under Specification MIL-V-5523. Uniquely low pressure differential is required between set of valve setting and unloading before pressure.



Curve showing extremely low internal leakage of Vickers Two-Port Balanced Piston Relief Valve.

## These **VICKERS** RELIEF VALVES TWO PORT • BALANCED PISTON Conform to Specification MIL-V-5523

The Vickers Two-Port Balanced Piston Relief Valves illustrated here conform to Specification MIL-V-5523. Their rated capacities (2, 3, 5 and 9 gpm) are greater than required by this Specification (1, 3, 5, 7.5 and 9 gpm respectively).

The curves at the left illustrate two important characteristics of these valves: (1) very low pressure variation from cranking point to maximum rated capacity, and (2) extremely low internal leakage (less than required by Specification MIL-V-5523). Smoother operation and greater accuracy throughout a wide range of pressure adjustment are other significant advantages. Operating pressure range is adjustable from 500 to 1500 psi without parts change.

These valves are also available in four-port models and can be provided with a vent control for unloading the system pressure. For further information about the complete line of Vickers Balanced Piston Relief Valves write for new Bulletin 4-5264.

### VICKERS Incorporated

DIVISION OF THE SPERRY CORPORATION  
1460 BAGMAN BLVD. • DETROIT 22, MICH.

ENGINEERS AND DESIGNERS OF AIRCRAFT HYDRAULIC EQUIPMENT SINCE 1921

## NEW AVIATION PRODUCTS



SUPERIOR shows up flaws (right) magnetically



GLO-MOR detects flaw (right) by fluorescence

## New Fault-Finders From Britain

Two new liquids for detecting cracks and other flaws in metal and non-metal aircraft parts by non-destructive means, have been developed by the British firm, Manchester Oil Refinery Ltd.

Both are petroleum-based products.

• **Superior Electro-Magnetic Ink** reveals internal defects and surface cracks in ferrous metals.

• **Glo-Mor Fluorescent Ink** detects only surface cracks in light metals, non-ferrous alloys, stainless steel and plastics.

Where parts are ferrous and can be magnetized, Superior offers a more satisfactory than ultrasonic or X-ray techniques of crack detection, because of its greater portability, simplicity and speed, according to the firm. These other methods require expensive apparatus which, particularly in the case of X-ray, cannot be used with overseas logistics and costings.

The Superior method requires only that the part be magnetized and ink applied by brushing or dipping. Magnetic powder in the ink is strongly attracted to the cracks, providing visible signs of flaws, even beneath the surface. The product is said to be free of coloring troubles—a slight shade of red that is required to impart magnetic properties to the ink puts no application.

When parts are non-ferrous and can't be magnetized, Glo-Mor partially fills the gap. It shows internal flaws if they extend to the surface. Typical applications include detection of cracks and holes in hydraulic systems, in aluminum and magnesium parts which have structural members in stress, in turbine blades for jet engines, engine pistons, and in parts that have been welded and may have shrinkage cracks or porosity. It also has proved useful in finding flaws in non-metal parts such as plastic assemblies, the firm says.

Glo-Mor is stated to be non-toxic. After dipping or brushing with Glo-Mor the part is allowed to dry for about a minute. It is then inspected under an ultraviolet light.

Manchester Oil Refinery Ltd., Twickenham Rd., Twickenham Park, Manchester 17, England.



## Indicator Light

A cockpit indicator light to overcome mounting problems imposed by ANP-59 edge-lighted instrument panels is being produced by Hethington, Inc. In this unit—the L1000—the light flange mounts on the backup plate of the panel and the socket extends through the edge of the panel. The plastic screws into the light socket from the front of the panel.

Sag fit of the socket in the indicator light cannot shield electronic edge lighting which might compete with the indicator light.

The light assembly is 1 1/2 in. long, weighs less than 3 oz. It is made of metal-plated brass finished in black, blue, green, red or white brass are available.

Hethington, Inc., Shreve, MISS. Pa.



Tekwood is light on its strong

Its remarkably high strength, low weight ratio (due to its kraft paper-and-hardware plywood-type construction) means you can ship with less weight at lower transportation costs. Strong, tough Tekwood also gives more protection for your aircraft parts.

Tekwood lowers labor costs, too. Tekwood can be worked more quickly and easily. Its smooth surfaces act as a built-in liner. Cuts cleanly to any shape or size. Won't splinter, buckle or split. And it takes staining beautifully.

What's more, Tekwood is low in cost.

Many of the leading aircraft parts manufacturers rely on Tekwood to lighten their cost loads. Investigate Tekwood for yourself. Mail coupon below.

### UNITED STATES PLYWOOD CORPORATION

44 West 40th Street, New York 18, N. Y.

World's Largest Plywood Organization

Manufacturers of Tekwood  
and Tekwood Plywood

Send me a product literature  
on: ☐ U. S. P. 10000  
This is not binding.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_





## YOUNG MEN OF VISION

*Their future is based on decisions made today. The secret of success at Indiana Gear is to visualize . . . create . . . prove . . . and then move on to conquer the next problem. Indiana Gear proves from past success in a highly competitive business that its policy of using master craftsmen, fine equipment, skilled subcontractors, and "young men of vision," exemplifies the perfectly coordinated planning so necessary to solve the gear problems of today.*



The drive gear shown here is 2" in pitch diameter and 15" long overall. It is carburized and hardened with heat treating stresses held within .001".

# INDIANA GEAR



INDIANA GEAR WORKS • INDIANAPOLIS 7, INDIANA

## WHAT'S NEW

### New Books

**History of Marine Aviation in World War II** by Robert Sherwell. Illustrated with numerous photos and maps, 496 pages, including index. Published by Combat Forces Press, 1115 17 St., N.W., Washington 5, D.C. Price \$6.50.

Marine aviation's role in World War II was growth, breakthrough by Navy's bold and brilliant carrier tactics and AAF's courageous efforts in towing down of the Japanese machine. Most of the glory the Marines claimed was credited to the sophisticated tactics that took one bloody island after another.

Another Sherwell title in the Mark series concerns what the flying Marines did. This is a tremendous book, not only in size, but content and style. Sherwell and his staff went through thousands of official U.S. and enemy documents to base the story.

A strong case is made for Marine aviation opening off its own canvas to carve out its grand unique objectives. One reason this didn't get started in this direction until too late in the war to make a really count, the author implies, was that the Marine forces were too misaligned at the end. The reader tactics of heavy Japanese over to "the leader situation of gravity."

This "defective" cost the Marines a place at the table of the strategy planners, with the result that Navy moved in as most of the close support mission, the reason for Marine aviation existence—B-16.

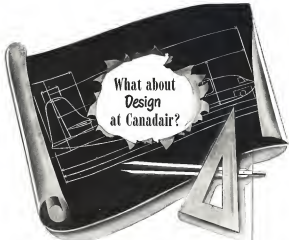
### Telling the Market

**Aviation books and equipment catalog** lists about 400 references is available from Aero Publishers, Inc., 2162 Street Blvd., Los Angeles 36.

Gluevise for production and more of iron casting, 56 pages, explains over 150 essential technical terms useful to the designer, machinist and engineer. Write International Nickel Co., Inc., Dept. 122, N. Y. 5.

Two-color booklet-reviews customer benefits of metal, is being distributed by Civil RPA Co., 6888 Wilshire, Los Angeles.

Detailed product specs to aid in selecting and ordering standard and fasteners are included in earlier **Standard Steel-Rivet On the Shelf**, from Star Stainless Steel Screw Co., 395 Union Ave., Paterson 2, N. J. Quality control of the entire welding wire manufacturing process is carried in a publication, **AMP Quality Control**, available from Aircraft-Machine Products, Inc., Harrison, N. J.



From the design boards to finished product Canadair has the experienced know-how designers of the highest caliber backed by the finest production facilities—a combination able to meet any demand in the manufacture of aircraft.

Airlines, transports, jet aircraft, such is the background of the men responsible for design at Canadair—men with years of previous experience in designing aircraft.

Canadair is proud of its design team—a team that is an integral part of the Company's complete aircraft manufacturing facilities.

# Canadair

UNITED, MONTREAL, CANADA

A subsidiary of  
**GENERAL DYNAMICS CORPORATION**  
Formerly General Electric  
New York, N.Y. — Washington, D.C.



DAVID WHITE





CONCEIVED *first*  
DEVELOPED *first*  
PRODUCED *first*

By

**Aeroquip**

AEROQUIP CORPORATION, JACKSON, MICHIGAN

SALES OFFICES: BURLING, CALIF.; DAYTON, OHIO; INDEPENDENCE, MO.; RICHMOND, N.C.; ALBANY SPRINGS, PA.; WINNEFALL, N.H.; PORTLAND, ORE.; WICKLI, CALIF.; TORONTO, CANADA

AEROQUIP PRODUCTS ARE FIRST PRODUCTION OF PARTS IN U.S.A. AND ABROAD

10 years of progress in aircraft hose standards have been passed by Aeroquip's 10 years of company history. Through constant research and development, Aeroquip has repeatedly anticipated the ever-changing requirements of the aircraft industry. The assistance and cooperation of R. F. Goodrich Co., The Army Air Forces, U. S. Navy Bureau of Aeronautics and C.A.A. are gratefully acknowledged in the development of these Aeroquip products.

## AIR TRANSPORT New Civil Air Safety Measures Proposed

- Passenger briefing in ditching procedure and effect of temperature-humidity on takeoffs are debated.
- But aft-facing seats find little favor among aviation leaders at annual airworthiness conference.

By F. Lee Moore

Hottest of the heated or more safety regulation proposals debated by pilots, airlines and civil aeronautics officials at the annual Airworthiness Review this month were temperature-humidity accountability and survival equipment and passenger briefing for ditching transports at sea.

Despite the immediate importance of many items on the agenda, long-range planning for future regulations dominated the session. The CAA-CAB Performance Committee is preparing an entire new set of air safety regulations to be proposed next year, so many of the proposals were referred to that group for future decisions.

Aircraft manufacturers remained quiet as most of the discussion of immediate safety problems because few questions involved any substantial redesign or change in present transports on order or in operation.

► **How on Cargo**—Even before the meeting got started, CAB Chairman Donald Nyrop lifted all the baggage loads of manufacturers and airlines interested in airbaggage by announcing that CAB will not allow higher gross weight certification for cargo operations than passenger service for any type plane. The Aeroquip Industries Association agreed that airbaggage should be allowed a 5% higher gross weight than passenger service of the same plane. They still would have to meet the same operating safety requirements, AIA pointed out. But Nyrop and the Board definitely has approved the proposal.

Here are summaries of some of the major discussions during the two series of consultation meetings:

### Temperature-Humidity

Capt. William Moss of Pan American, representing Air Line Pilots Association, made an appeal for immediate action to make aircraft and aerial club aircraft seats more easily convertible to increase performance in high temperatures and humidity.

He said a plane that can clear a 30 ft

obstacle by 33 ft on a standard day cannot clear the same obstacle when the temperature is 110°.

Moss, speaking to the members of the meeting, "accrued that the airline pilots are constantly complaining about the poor performance of airplanes in adverse temperature and humidity conditions and that the ALPA is bringing up this subject again, wants everyone to know how strongly they feel about it."

At Dallas Air Transport Association, it would be inappropriate and extremely difficult to apply temperature and humidity accountability in present regulations. He added that more airplanes already include temperature-humidity accountability in their operational procedures.

► **Other Views**—Mr. Charles Walter said Air Force data on the C-97 indicate significant decrease in performance with increasing temperature and humidity, but American Airlines' H. E. Huber questioned the validity of the Air Force power calculations.

Walter Cohen of Lockheed then suggested that the new performance regulations proposed by the CAA-CAB Performance Committee "adequately" must include "full" temperature-humidity accountability. Capt. Moss said ALPA's reply to that was that the Performance Committee could not say but wants "complete action."

Owner William of CAA closed the discussion with a cooperative statement that the present partial temperature-humidity accountability in the regulations results in a compromise at the end of the ticket runway. He said CAA would acquiesce if CAB feels there should be an immediate, temporary tightening of the regulations. But he also agreed with Cohen that the Performance Committee's new regulation proposals will take full account of temperature and humidity effect on aircraft performance.

### Survival in Water

So far the year, two airlines have been declared a rule or in some cases a law (CWA of Stagg, PAA San Juan) with the aim at 80 of the 112 aircraft,

even though few if any were hurt in such in the actual landings. With the year underway, the Airworthiness Review participants decided were time to discuss that any other subject.

► **Backlog**—Harriet item of debate was Captain Pilot John Davis's recommendation of extreme passenger briefing before landing over water flights. An American Airlines representative should be briefing, but said the extent of it should depend on the plane's destination. And ATA said briefing would be more effective if the passenger seat in the plane is to be held above location of life jackets, rafts and rafts. The association also urged that the briefing equipment be left up to CAA determination, rather than make a rigid regulation by CAA.

CAA indicated briefing should be required mainly on long over-water flights.

► **Life Jackets**—Air Line Pilots Association urged that seat or overhead application equipment be made of life preserver material in all transport planes.

Tom Lincoln, ALPA's safety-engineering officer, said that if transports had life jackets water ditching would be much less of a risk in trouble near water might prefer it to a land crash. ATA commented that the suggestion had considerable merit. Dr. Harry Kopp of CAA and the SAF Seat Comfort and Release Committee might have some things to add to this line of thought.

Capt. Moss also noted that life jackets must be placed where passenger can see and grab them fast. He said that he has seen several accidents where passengers, when told to go to life jackets for protection, took five minutes to comply. The action should be one to get on, he added. It was noted that these experiences with life jackets have been reported by some of the airline pilots.

► **Life Rafts**—Pilots also urged that life rafts be made more easily accessible. Airlines provision to this new ditching experiences generally located rafts improperly, the conference noted. That was because of the theory there would be enough warning to get the rafts to the door and exit before crashing.

The discussion avoided matters of saving and ditching locations of rafts on various type planes.

Conference had a tough problem deciding what new rule should be enacted. While discussion was not over this time, solutions, several opinions seemed to be that 20-minute rafts should be located







## What Should *You-* as an EXPERIENCED ENGINEER Expect from Your Job?

- GOOD PAY?
- PLEASANT WORKING CONDITIONS?
- CHANCE FOR FUTURE?
- OFF-THE-JOB ADVANTAGES FOR YOU AND YOUR FAMILY?

It's ALWAYS good at LOCKHEED—and substantial increases have recently gone into effect.

LOCKHEED's new Georgia Division offers the best—and your associates will be outstanding leaders in their fields. Your work with them will be inspiring and rewarding.

LOCKHEED is one of the greatest names in both civilian and military aviation. You can count on LOCKHEED leadership now and in the future—and you can count on YOUR opportunity with LOCKHEED.

LOCKHEED's Georgia division, at Marietta, only 8 miles from the Atlanta city limits, offers unlimited opportunities for healthy, pleasant living, for cultural and educational advantages for your whole family.

North Georgia is famous for its fine climate and outdoor sports. Atlanta's 88 parks cover 3400 acres, and 22 excellent golf courses offer year-round enjoyment.

Desirable, modern housing and gracious Southern living; exceptional schools, colleges and universities; outstanding music, theatre, radio and television entertainment await the LOCKHEED Engineer and his family. The needs of all creeds and denominations are filled by more than 500 churches.

EVERYTHING you, as an EXPERIENCED ENGINEER, could want from your job awaits you at LOCKHEED's Georgia Division.

✂ (If you prefer the "Fast Door" procedure, you associates will be promptly transferred to LOCKHEED at Burbank, Calif., where similar opportunities are available.)

### CLIP AND MAIL TODAY!

Lockheed Employment Manager  
1661 Peachtree Rd., N.E.  
Atlanta, Ga. 30309 AWP

Please send full details  
on MY opportunity  
at LOCKHEED

Name \_\_\_\_\_

Address \_\_\_\_\_

Job Interested In \_\_\_\_\_



## Collins Reports on Navigation Aids

Collins Radio Co. is the past few weeks has received.

• The biggest single order to date (about \$50,000) for airborne radio-compass-438 twenty-channel type 51W-1 receivers and accessories—placed by Argentine Airlines.

• First order placed in U.S. by Canada for airborne VOR equipment as its equivalent quantity for equipping Trans-Canada Air Lines' fleet. Total value of more than \$100,000 includes 238-channel VOR communication navigation receivers, Type 51R. Also, Type 51R-2 automatic direction finder which the firm says can be used with one HF antenna at any frequency in the HF range (2 to 25 mc) without necessitating change of loading coils.

• Letter of intent by Sabena to install 235 (Integrated Triple System), making the Belgian carrier one of the first commercial airlines to move toward serious evaluation of the equipment (competitive with the Sperry Zen Reader) visual navigation aid and the first foreign operator to do so.

## Australian Lines Foresee Gains

(McGraw-Hill World News)

Melbourne—Australia's domestic airlines expect to handle 2 million passengers this year, based on the fact they flew 1,846,618 in 1951, a 238,000 increase over the previous year.

Last year the carriers flew twice faster than 43.5 million miles along 79,000 routes.

only. In addition to passengers, they carried 54,402 tons of freight, 10% more than 1950. Their flying time totaled 272,000 hr., also a 10% increase over 1950.

Australian National Airways carried 675,557 passengers more than 13,742,000 mi., leading its most government-owned Trans-Australia Airlines, which flew 668,435 passengers 10,968,000 mi.

## Colombian Nonskid

(McGraw-Hill World News)

Bogota—A single-engine five-passenger Bonanza accident surface between Guadalupe, Bogota, Nariño, and other points south on the Magdalena River is planned for inauguration at an early date. Name of the carrier is Lakana. The new airline's pilot are to leave for the U.S. soon to pick up their planes.

## TWA Cargo

Town—TWA Airlines plans to increase its trans-Atlantic all cargo flights Sept. 5 using Douglas DC-7s leaving New York Friday evenings, from Paris on Sunday evenings. The carrier dropped its previous all-cargo flights after it joined the Korean airline, used the cargo compartments of its international Constellations, which handled 12,572,000 cargo ton miles last year.

## Climbing Bays

(McGraw-Hill World News)

Rome—Climbing Airport, since 15 m. from Rome, is becoming one of the busiest fields in Europe—last year 418,383 passengers landed or took off from the field. Carriers using the terminal numbered 57 and plane arrivals and departures totaled 27,110.



## PITTSBURGH TERMINAL OPENS

Actual cost of terminal facilities at Allegheny County's Greater Pittsburgh Airport opened recently. Cost of the \$300,000

terminal is estimated at \$31.5 million. It is reported to be the world's second largest field in physical size.

## ANDREW BROWN COMPANY PRODUCT BULLETIN

## SN704 ZINC CHROMATE AIRCRAFT PRIMER

AN approved  
MIL. A-1000, MIL. A-1001  
MIL. A-1002, MIL. A-1003  
NOW THE WORLD'S  
LARGEST VOLUME PRIMER

### OF ITS TYPE I

1. Unexcelled Dry Touch
2. Superior Lacquer Holdout
3. Fast Drying
4. Excellent Spreading Film

### USES include:

Automotive  
Boeing Aircraft Company  
Lockheed Aircraft Company  
United States Navy  
United States Army  
United States Air Force  
United States Coast Guard  
United States Marine Corps  
United States Navy  
United States Army  
United States Air Force  
United States Coast Guard  
United States Marine Corps  
United States Navy  
United States Army  
United States Air Force  
United States Coast Guard  
United States Marine Corps

### AVAILABILITY:

As used in military operations, this product is available in 100 lb. drums, 50 lb. drums, 25 lb. drums, 10 lb. drums, 5 lb. drums, 1 lb. drums, 1/2 lb. drums, 1/4 lb. drums, 1/8 lb. drums, 1/16 lb. drums, 1/32 lb. drums, 1/64 lb. drums, 1/128 lb. drums, 1/256 lb. drums, 1/512 lb. drums, 1/1024 lb. drums, 1/2048 lb. drums, 1/4096 lb. drums, 1/8192 lb. drums, 1/16384 lb. drums, 1/32768 lb. drums, 1/65536 lb. drums, 1/131072 lb. drums, 1/262144 lb. drums, 1/524288 lb. drums, 1/1048576 lb. drums, 1/2097152 lb. drums, 1/4194304 lb. drums, 1/8388608 lb. drums, 1/16777216 lb. drums, 1/33554432 lb. drums, 1/67108864 lb. drums, 1/134217728 lb. drums, 1/268435456 lb. drums, 1/536870912 lb. drums, 1/1073741824 lb. drums, 1/2147483648 lb. drums, 1/4294967296 lb. drums, 1/8589934592 lb. drums, 1/17179869184 lb. drums, 1/34359738368 lb. drums, 1/68719476736 lb. drums, 1/137438953472 lb. drums, 1/274877906944 lb. drums, 1/549755813888 lb. drums, 1/1099511627776 lb. drums, 1/2199023255552 lb. drums, 1/4398046511104 lb. drums, 1/8796093022208 lb. drums, 1/17592186044416 lb. drums, 1/35184372088832 lb. drums, 1/70368744177664 lb. drums, 1/140737488355328 lb. drums, 1/281474976710656 lb. drums, 1/562949953421312 lb. drums, 1/1125899906842624 lb. drums, 1/2251799813685248 lb. drums, 1/4503599627370496 lb. drums, 1/9007199254740992 lb. drums, 1/18014398509481984 lb. drums, 1/36028797018963968 lb. drums, 1/72057594037927936 lb. drums, 1/144115188075855872 lb. drums, 1/288230376151711744 lb. drums, 1/576460752303423488 lb. drums, 1/1152921504606846976 lb. drums, 1/2305843009213693952 lb. drums, 1/4611686018427387904 lb. drums, 1/9223372036854775808 lb. drums, 1/18446744073709551616 lb. drums, 1/36893488147419103232 lb. drums, 1/73786976294838206464 lb. drums, 1/147573952589676412928 lb. drums, 1/295147905179352825856 lb. drums, 1/590295810358705651712 lb. drums, 1/1180591620717411303424 lb. drums, 1/2361183241434822606848 lb. drums, 1/4722366482869645213696 lb. drums, 1/9444732965739290427392 lb. drums, 1/18889465931478580854784 lb. drums, 1/37778931862957161709568 lb. drums, 1/75557863725914323419136 lb. drums, 1/151115727451828646838272 lb. drums, 1/302231454903657293676544 lb. drums, 1/604462909807314587353088 lb. drums, 1/1208925819614629174706176 lb. drums, 1/2417851639229258349412352 lb. drums, 1/4835703278458516698824704 lb. drums, 1/9671406556917033397649408 lb. drums, 1/19342813113834066795298816 lb. drums, 1/38685626227668133590597632 lb. drums, 1/77371252455336267181195264 lb. drums, 1/154742504910672534362390528 lb. drums, 1/309485009821345068724781056 lb. drums, 1/618970019642690137449562112 lb. drums, 1/1237940039285380274899124224 lb. drums, 1/2475880078570760549798248448 lb. drums, 1/4951760157141521099596496896 lb. drums, 1/9903520314283042199192993792 lb. drums, 1/19807040628566084398385987584 lb. drums, 1/39614081257132168796771975168 lb. drums, 1/79228162514264337593543950336 lb. drums, 1/158456325028528675187087900672 lb. drums, 1/316912650057057350374175801344 lb. drums, 1/633825300114114700748351602688 lb. drums, 1/1267650600228229401496703205376 lb. drums, 1/2535301200456458802993406410752 lb. drums, 1/5070602400912917605986812821504 lb. drums, 1/10141204801825835211973625643008 lb. drums, 1/20282409603651670423947251286016 lb. drums, 1/40564819207303340847894502572032 lb. drums, 1/81129638414606681695789005144064 lb. drums, 1/162259276829213363391578010288128 lb. drums, 1/324518553658426726783156020576256 lb. drums, 1/649037107316853453566312041152512 lb. drums, 1/1298074214633706907132624082305024 lb. drums, 1/2596148429267413814265248164610048 lb. drums, 1/5192296858534827628530496329220096 lb. drums, 1/10384593717069655257060992658440192 lb. drums, 1/20769187434139310514121985316880384 lb. drums, 1/41538374868278621028243970633760768 lb. drums, 1/83076749736557242056487941267521536 lb. drums, 1/166153499473114484112975882535043072 lb. drums, 1/332306998946228968225951765070086144 lb. drums, 1/664613997892457936451903530140172288 lb. drums, 1/1329227995784915872903807060280344576 lb. drums, 1/2658455991569831745807614120560689152 lb. drums, 1/5316911983139663491615228241121378304 lb. drums, 1/10633823966279326983230456482242756608 lb. drums, 1/21267647932558653966460912964485513216 lb. drums, 1/42535295865117307932921825928971026432 lb. drums, 1/85070591730234615865843651857942052864 lb. drums, 1/170141183460469231731687303715884105728 lb. drums, 1/340282366920938463463374607431768211456 lb. drums, 1/680564733841876926926749214863536422912 lb. drums, 1/1361129467683753853853498429727072845824 lb. drums, 1/2722258935367507707706996859454145691648 lb. drums, 1/5444517870735015415413993718908291383296 lb. drums, 1/10889035741470030830827987437816582766592 lb. drums, 1/21778071482940061661655974875633165533184 lb. drums, 1/43556142965880123323311949751266331066368 lb. drums, 1/87112285931760246646623899502532662132736 lb. drums, 1/174224571863520493293247799005065244265472 lb. drums, 1/348449143727040986586495598010130488530944 lb. drums, 1/696898287454081973172991196020260977061888 lb. drums, 1/1393796574908163946345982392040521954123776 lb. drums, 1/2787593149816327892691964784081043908247552 lb. drums, 1/5575186299632655785383929568162087816495104 lb. drums, 1/11150372599265311570767859136324173632990208 lb. drums, 1/22300745198530623141535718272648347265980416 lb. drums, 1/44601490397061246283071436545296694531960832 lb. drums, 1/89202980794122492566142873090593389063921664 lb. drums, 1/178405961588244985132285746181186778127843328 lb. drums, 1/356811923176489970264571492362373556255686656 lb. drums, 1/713623846352979940529142984724747112511373312 lb. drums, 1/1427247692705959881058285969449494225022746624 lb. drums, 1/2854495385411919762116571938898988450045493248 lb. drums, 1/5708990770823839524233143877797976900090986496 lb. drums, 1/11417981541647679048466287755595953800181972992 lb. drums, 1/22835963083295358096932575511191907600363945984 lb. drums, 1/45671926166590716193865151022383815200727891968 lb. drums, 1/91343852333181432387730302044767630401455783936 lb. drums, 1/182687704666362864775460604089535260802911567872 lb. drums, 1/365375409332725729550921208179070521605823135744 lb. drums, 1/730750818665451459101842416358141043211646271488 lb. drums, 1/1461501637330902918203684832716282086423292542976 lb. drums, 1/2923003274661805836407369665432564172846585085952 lb. drums, 1/5846006549323611672814739330865128345693170171904 lb. drums, 1/11692013098647223345629478661730256691386340343808 lb. drums, 1/23384026197294446691258957323460513382772680687616 lb. drums, 1/46768052394588893382517914646921026765545361375232 lb. drums, 1/93536104789177786765035829293842053531090722750464 lb. drums, 1/187072209578355573530071658587684107062181445500928 lb. drums, 1/374144419156711147060143317175368214124362891001952 lb. drums, 1/748288838313422294120286634350736428248725782003904 lb. drums, 1/1496577676626844588240573268701472856497451564007808 lb. drums, 1/2993155353253689176481146537402945712994903128015616 lb. drums, 1/5986310706507378352962293074805891425989806256031232 lb. drums, 1/11972621413014756705924586149611782851979612512062464 lb. drums, 1/23945242826029513411849172299223565703959225024124928 lb. drums, 1/47890485652059026823698344598447131407918450048249856 lb. drums, 1/95780971304118053647396689196894262815836900096499712 lb. drums, 1/19156194260823610729479337839378852563167380019399424 lb. drums, 1/38312388521647221458958675678757705126334760038798848 lb. drums, 1/76624777043294442917917351357515410252669520077597696 lb. drums, 1/153249554086588885835834702715030820505339040155955392 lb. drums, 1/306499108173177771671669405430061641010678080311910784 lb. drums, 1/612998216346355543343338810860123282021356160623821568 lb. drums, 1/12259964326927110866866776217202465640427123212476432 lb. drums, 1/24519928653854221733733552434404931280854246424952864 lb. drums, 1/49039857307708443467467104868809862561708492849905728 lb. drums, 1/98079714615416886934934209737619725123416985699811456 lb. drums, 1/19615942923083377386986841947523945024683397139962304 lb. drums, 1/39231885846166754773973683895047890049366794279924608 lb. drums, 1/78463771692333509547947367790095780098733588559849216 lb. drums, 1/156927543384667019095894735580191560197467177119698432 lb. drums, 1/313855086769334038191789471160383120394934354239396864 lb. drums, 1/627710173538668076383578942320766240789868708478793728 lb. drums, 1/1255420347077336152767157884641532481579737416957587456 lb. drums, 1/2510840694154672305534315769283064963159474833915174912 lb. drums, 1/5021681388309344611068631538566129926318949667830349824 lb. drums, 1/1004336277661868922213726307713225953263789933566069952 lb. drums, 1/2008672555323737844427452615426451906527579867132139904 lb. drums, 1/401734511064747568885490523085290381305515973426427808 lb. drums, 1/803469022129495137770981046170580762611031946852855616 lb. drums, 1/1606938044258990275541962092341161525222063893705711232 lb. drums, 1/3213876088517980551083924184682323050444127787411422464 lb. drums, 1/6427752177035961102167848369364646100888255574822844928 lb. drums, 1/12855504354071922204335696738729292201776511149645789856 lb. drums, 1/25711008708143844408671393477458584403553022299291579712 lb. drums, 1/51422017416287688817342786954917168807106044598583159424 lb. drums, 1/102844034832575377634685573909834337614212089197166318848 lb. drums, 1/205688069665150755269371147819668675228424178394332637696 lb. drums, 1/411376139330301510538742295639337350456848356788665275392 lb. drums, 1/822752278660603021077484591278674700913696713577330550784 lb. drums, 1/1645504557321206042154969182557349401827393427154661101568 lb. drums, 1/3291009114642412084309938365114698803654786854309322203136 lb. drums, 1/6582018229284824168619876730229397607309573708618644406272 lb. drums, 1/13164036458569648337239753460458795214619147417237288812544 lb. drums, 1/26328072917139296674479506920917590429238294834474577625088 lb. drums, 1/52656145834278593348959013841835180858476589668949155250176 lb. drums, 1/105312291668557186697918027683670361716953179337898310500352 lb. drums, 1/210624583337114373395836055367340723433906358675796621000704 lb. drums, 1/421249166674228746791672110734681446867812717351593242001408 lb. drums, 1/842498333348457493583344221469362893735625434703186484002816 lb. drums, 1/1684996666896914987166688442938725787471250869406372968005632 lb. drums, 1/3369993333793829974333376885877451574942501738812745936011264 lb. drums, 1/6739986667587659948666753771754903149885003477625491872022528 lb. drums, 1/1347997333517531989733350754350





*the aircraft carriers  
that never put to sea...*



TWIN COACH maintains its own aircraft carriers—a large fleet of modern over-the-road units for shipping complete assemblies.

These company owned and operated vehicles, and specially designed carrying devices, are tailored for individual jobs—eliminate stress and strain on precision-made parts. This assures prime condition that assemblies built by Twin Coach arrive undamaged—on time.

This smooth efficiency is typical of Twin Coach Aircraft Division plans. It enables prime contractors to set and hold tight production schedules. Modern facilities, modern equipment and experienced manpower make Twin Coach a dependable source for every type of major aircraft assembly.

A-100



John Collins, Traffic Manager, has been shipping aircraft assemblies down the days of road and holds credit up to \$100,000 in the aircraft industry.



**TWIN COACH COMPANY**

*Aircraft Division*

**BUFFALO, N. Y.**

**TWIN COACH PRODUCTS:**

AIRCRAFT ASSEMBLIES • MOTOR DRIVERS • TRUCKS • TRAILERS • SUPER FREIGHTER CARD TRUCKS  
\* FUEL OIL, GASOLINE AND PROPANE ENGINES • FUEL OIL, GASOLINE AND PROPANE ENGINES

## Small Airports Are Vanishing

The rapidly deteriorating picture as port situation in the Los Angeles County area is the subject of serious concern of local officials who point with alarm to statistics showing that more than half the county's small fields have disappeared in the last dozen years.

Recent expansion of industry and housing developments in the Southern California area which are gobbling up small fields at a high rate. In 1944 there were 57 metropolitan fields, now there are less than 20. "Many more are slated for construction unless drastic measures are taken," Nathan J. Burke, chairman of the Chamber of Commerce's aviation committee, points out.

## Aviamec Service

(McGraw-Hill World News)

Begins—The Colombian airline, Aviamec, plans to increase its European service via Bermuda from one flight every two weeks to once a week. The new schedule is expected to begin in September.

## SHORTLINES

► Air Transport Assn. annual Engineering and Maintenance Conference Sept. 25-26 will be open only to airline personnel and government officials this year because of exceptionally large attendance at past open meetings of the group.

► British Overseas Airways has been granted rights of overhang within Fukuoka, carrying passengers between Kailash and Osaka.

► California Executive Airlines president Col. C. C. Starnes has asked CAB permission to cut its California-Boston line to 5121-58 from 5129 starting Sept. 1. Transportation agencies at the lower fare using its DCA 6A recently bought from Slick.

► Civil Aeronautics Board probably will not allow the airlines to drop their trademark 5% discount on roundtrip tickets, otherwise say, sales could go up radically between now and November. CAB also is studying a proposed amendment of scheduled air fares generally.

► Colair Airlines asks to Eastern Air Lines reportedly larger as how CAB decides on route between Minneapolis, the proposed conference report. "Would the proposed acquisition of

need **GYROS** ?



Giannini makes them  
**FREE • VERTICAL • DIRECTIONAL • RATE**

Write us about your gyro problems, both A.C. and D.C.

**Giannini**

G. M. GIANNINI & CO., INC.  
Pasadena 1, California

Growing Steadily to Provide  
*Every* AIRCRAFT NEED from ONE SOURCE

For  
**AIRCRAFT  
PRODUCTION**

**AIRCRAFT  
OPERATION  
and  
MAINTENANCE**

Get New Store and Office  
Just Opened at Burbank



**Van Dusen** AIRCRAFT  
SUPPLIES  
TERRACED, N. J. MINNEAPOLIS, MINN. BOSTON, MASS.



## SEARCHLIGHT SECTION

**EMPLOYMENT OPPORTUNITIES**

## ENTREPRENEUR

For further information on any of these items, please contact the author.

## TABLE 1

The advertising rate is \$100 per line for all advertising material on other than a normal basis. Normal rates quoted as follows:

1990年12月15日 1991年12月15日

[illegible]

## ENGINEER

Cash (apt. Furn. Separate)  
Indulgethly Adapted  
**LEAR, INCORPORATED**  
Rings (diamond)  
Apt. Ring 1944. 2000

**WANTED**  
**Experienced SALES Engineers**

**EXCITING SALES ENGINEER**  
Philadelphia... Western Territory  
Products: Transcendental Saw Tools and  
Machine Mechanical Division  
**JOHN J. HARMON, INC.**  
40 East Belmont Ave. Springfield, Mass.

## FLORIDA DISTRIBUTORSHIPS WANTED

By the direct and hard-knuckled manufacturing feel of the lines of the Southern Engineers, introduced in the distribution and sale of several products, *Entrepreneur* and *Target* equipment is

Intake regarding financial stress, behavior, personal self exposure will be included as noted.

Frank Andrews Aviation Florida, Inc.  
5081 NW 34th Street  
Dade & Co. Box 121, International Airport  
MIAMI 48, FLORIDA  
TEL. 35-3324

## BOX NUMBER

When perusing the classified advertisements in this magazine, don't forget to put the two numbers on your envelope. It's not only means of identifying the advertisement, but also means.

sects result in the creation of a monopoly and thereby restrain competition or otherwise affect the market.

• **Fancy Air Freight Corp.'s** new tariff includes rate cuts up to 20% on over 100 lb. shipments. It also includes an "assembly service" rate for substantially collecting all freight for a single consignee and delivering it as a package each day.

\*International Air Transport Assn. reports intruding cleaners of \$100,435,000 the first half of this year, up 11% from a year ago. June total of \$38,225,000 was up 36% from a year ago.

► Los Angeles Airways has ordered three more Sikorsky S-55 options for delivery next year, increasing the LAA fleet to five S-55s and three S-61s.

■ Military Air Transport Service has ordered 14 power-assisted litter lifts for use on its C-119s. New version weighs 250 lb and can hold two patients simultaneously.

■ **North American Airlines** has canceled plans to install air-facing seats in its new DC-8. Reason: evidence presented at the annual aerodynamics conference that the seats may be no safer than conventional seating.

■ Northwest Airlines load factor the first 13 days of August was 69%, compared with 77% for August, 1951, and 68% last month.

► Pan American World Airways has asked CAB to increase mail pay on its Latin American routes, citing a \$3.5-million loss the first six months of this year on that division. PAA starts Super DC-6 service Sept. 1 on its round-the-world "Asia Express" flights, cutting 5½ hr. from the present 61-day schedule. The snap-on-top PanAm DC-6Bs cost \$5 on this service, 82 per cent on trans-Atlantic coach.

► Seaboard & Western Arkansas River 602,146 revenue miles in commercial and military operation in June, 8% over a year ago. Fleet utilization averaged 13.6 hr. per day. S & W says

► Trans Caribbean Airways has asked CAA for a trans-Atlantic air freight certificate or special exemption, hoping to have its application consolidated in the proposed east of Scotland, Trans-europe and Europe-Americas.

\* **Trans World Airlines** last week started operating its new trans-Atlantic route via the Azores to Lisbon, Madrid and Rome. Company has succeeded in getting CAB to lift restriction on service to Santa Fe and Albuquerque.

# RESEARCH AND DEVELOPMENT

forge the KEY to America's future in the AIR  
take YOUR place . . . with GOODYEAR AIRCRAFT

The continued and steady growth of established research and development projects presents a number of unusual opportunities for autonomous and experienced men-

## SCIENTISTS

## ENGINEERS

## DESIGNERS

Positions are available in our organisation for qualified personnel in the following fields:

- \* Electrical Systems
- \* Circuit Analysis
- \* Analog Computers
- \* Servomechanisms
- \* Test Equipment
- \* Structures
- \* Aerodynamics
- \* Applied Mathematics
- \* Electronics
- \* Physics
- \* Stress Analysis
- \* Flight Test
- \* Missile Design
- \* Dynamics
- \* Microwaves

Openings also exist for welding engineers, civil engineers, and mechanical engineers with experience in metals fabrication, and for personnel with ability and experience in technical editing, art, and marine pictures.

Positions are available at several levels, and inquiries are also invited from recent graduates. Salaries are based on education, ability, and experience. Liberal salary, vacation, insurance, and retirement plans are yours if you qualify.

If YOU are interested in a secure future, write, giving full details, to  
Mr. C. G. Jones, Salary Personnel Department













## COCKPIT VIEWPOINT

By Capt. R. C. Robson



### A Practical Guide For Sign Painters

"Consignments" is a phenomenon highly developed in the aviation world. It is the process by which we find out how to do things—in the approved manner.

A specific example of this is found in a recent work from the CAA Technical Development and Evaluation Center: it concerns fuselage signs on airports. The CAA Technical Sign Evaluation Committee was composed of members from the Offices of Aviation Safety, Federal Airways and Airports and the TDEC. Report 171 is the result.

Can you already believe that it was possible to produce signs merely by inspecting some numbers and signs? Far from it. As Report 171 states: "It is important that the guidance furnished by signs should be of such clarity and simplicity as to be readily comprehended by the true sign pilot." So to aid this pilot, on a Report 171, signs shall use standard abbreviations such as RGN, HTN, etc. Obviously of the pilot has to do a decade those to know what's what.

► **Bailed, Arrows**—Of course the sign contains arrows. But a word of caution should be given to those intending to produce signs. As a footnote delicately points out, "Balls of arrows should never be placed in a horizontal or vertical position."

On the question of pointing dots and dashes the report specifies in less apt to have trouble, for both the dot and dash are clearly illustrated in Appendix I, Fig. 3. The dot drawing is further simplified in the last (page 5, para. 31) by an unexpected statement that the "circular dot" be used. However, nothing so hard a pointed-out device to some judgment may be required here.

These dots and dashes are important too, they provide sort of a code of their own. Imagine a pilot leaving the ramp. He counts to a sign saying 18-16. This means he has reached the north-west corner. Next a sign reads 15-15. This will not indicate, as might be guessed, that the runway has a 1500 ft bend in the middle. By use of a dot here, instead of the dash, the lowest-level pilot will be able to differentiate and realize this twelve serves two corners.

Report 171 contains several other specifications such as Signs should be from 25 to 30 in. high, not more than 30 in. from the pavement's edge, weight held to a convenient size. More complete information will have to wait for the forthcoming report setting down "the technical and experimental data upon which the design is based."

To illustrate the difference in superiority between duly approved "conventional" signs and those of the common home sense variety, take Boston. Here the signs are positively loaded with their plans (English, like "The Restless 9," "Castell Tower," "Runway 15-1533 feet").

► **Signs in Boston**—These wooden signs are no 30 in. sheeps either, but a robust 6 ft. and the numbers were held down with such lengths of railroad track. Called Edson, the airport manager, admits that one was blown down once during a hurricane and also that they are placed some 55 ft. from pavement. This latter seems to be the result of the blow, but that same in Boston sometimes becomes pretty dense. It is only fair to state that no such law have outside on the basis of Boston's answer, as on the use of circular dots. These home-made signs might keep traffic moving too fast for this type of observation.

Boston, however, should not be overly alarmed. The Report clearly states that "this is a technical information report and does not necessarily represent CAA policy in all respects."

Thank goodness!

## STRICTLY PERSONAL

### Korea Testimony

Months ago here we asked you to thought up the aims of the home signs, Korea Testimony. Charles Goodrich, public relations director, said:

"I've been unable to be the plunger to turn one person since it was well told outside by some Korean engineers during the early days of the company. However, as in so many of our home signs, I should say Charles Kinnick took the charge. He had heard people misperceptions his name Kinnick for years (one still did not) but he realized the same would help strengthen things out as well as describe the person out of our personnel."

\*\*\*

### Lober's News Bulletin

Did you know that H. Z. Marx, president of Maxima Products Co., Inc. of Highland, Calif., is also Zepher Marx, one of the original "Mani" bandits?

\*\*\*

### Windows From Across the Sea

That refreshingly different aviation magazine, *Aeromarine*, from England, reviewed the design reference in one of its standard testing book reviews, discussing "Aircraft Maintenance," by Rennie & Rogers, and published in England.

The work of maintaining aircraft in order to complete in the various countries is not only a challenge to the standards of the United States Civil Aeronautics Administration but also a long way towards solving long-standing problems which seem to be an object of most of the industrialized by the increasing operation in demands shall be devoted to detail work and to the research and presentation of information about it.

\*\*\*\*\*

Bill Gold's column in the *Washington Post* appears some most publicity often in Europe.

The Canadian has been photographing points and signs around the Continent since, *American Gun House*.

Decided signs of a homogenous airline have been put on their own sign right underneath a little legend which suggests by T.O. A.

\*\*\*

### He Really Had to Go!

Robert Hood of Selenia Aircraft's purchasing department, noticeably without the proper channels, can announce success in obtaining "rent price" according to standard operating procedure. The plan enabled him to leave work only at 3:15 p.m. Hood presented his plan to Frank Landolt, the identity good. This "rent price" was:

"Boston for leaving—Horse on fire!"  
—The Reducer

## ADVERTISERS IN THIS ISSUE

AVIATION WEEK—SEPTEMBER 1, 1952

21	BARRETT'S AIRCRAFT CO.	22	W. J. WILSON SHOP
23	AVIATION AIRCRAFT CO.	24	AVIATION AIRCRAFT CO.
25	AVIATION AIRCRAFT CO.	26	AVIATION AIRCRAFT CO.
27	AVIATION AIRCRAFT CO.	28	AVIATION AIRCRAFT CO.
29	AVIATION AIRCRAFT CO.	30	AVIATION AIRCRAFT CO.
31	AVIATION AIRCRAFT CO.	32	AVIATION AIRCRAFT CO.
33	AVIATION AIRCRAFT CO.	34	AVIATION AIRCRAFT CO.
35	AVIATION AIRCRAFT CO.	36	AVIATION AIRCRAFT CO.
37	AVIATION AIRCRAFT CO.	38	AVIATION AIRCRAFT CO.
39	AVIATION AIRCRAFT CO.	40	AVIATION AIRCRAFT CO.
41	AVIATION AIRCRAFT CO.	42	AVIATION AIRCRAFT CO.
43	AVIATION AIRCRAFT CO.	44	AVIATION AIRCRAFT CO.
45	AVIATION AIRCRAFT CO.	46	AVIATION AIRCRAFT CO.
47	AVIATION AIRCRAFT CO.	48	AVIATION AIRCRAFT CO.
49	AVIATION AIRCRAFT CO.	50	AVIATION AIRCRAFT CO.
51	AVIATION AIRCRAFT CO.	52	AVIATION AIRCRAFT CO.
53	AVIATION AIRCRAFT CO.	54	AVIATION AIRCRAFT CO.
55	AVIATION AIRCRAFT CO.	56	AVIATION AIRCRAFT CO.
57	AVIATION AIRCRAFT CO.	58	AVIATION AIRCRAFT CO.
59	AVIATION AIRCRAFT CO.	60	AVIATION AIRCRAFT CO.
61	AVIATION AIRCRAFT CO.	62	AVIATION AIRCRAFT CO.
63	AVIATION AIRCRAFT CO.	64	AVIATION AIRCRAFT CO.
65	AVIATION AIRCRAFT CO.	66	AVIATION AIRCRAFT CO.
67	AVIATION AIRCRAFT CO.	68	AVIATION AIRCRAFT CO.
69	AVIATION AIRCRAFT CO.	70	AVIATION AIRCRAFT CO.
71	AVIATION AIRCRAFT CO.	72	AVIATION AIRCRAFT CO.
73	AVIATION AIRCRAFT CO.	74	AVIATION AIRCRAFT CO.
75	AVIATION AIRCRAFT CO.	76	AVIATION AIRCRAFT CO.
77	AVIATION AIRCRAFT CO.	78	AVIATION AIRCRAFT CO.
79	AVIATION AIRCRAFT CO.	80	AVIATION AIRCRAFT CO.
81	AVIATION AIRCRAFT CO.	82	AVIATION AIRCRAFT CO.
83	AVIATION AIRCRAFT CO.	84	AVIATION AIRCRAFT CO.
85	AVIATION AIRCRAFT CO.	86	AVIATION AIRCRAFT CO.
87	AVIATION AIRCRAFT CO.	88	AVIATION AIRCRAFT CO.
89	AVIATION AIRCRAFT CO.	90	AVIATION AIRCRAFT CO.
91	AVIATION AIRCRAFT CO.	92	AVIATION AIRCRAFT CO.
93	AVIATION AIRCRAFT CO.	94	AVIATION AIRCRAFT CO.
95	AVIATION AIRCRAFT CO.	96	AVIATION AIRCRAFT CO.
97	AVIATION AIRCRAFT CO.	98	AVIATION AIRCRAFT CO.
99	AVIATION AIRCRAFT CO.	100	AVIATION AIRCRAFT CO.

**B.H. AIRCRAFT CO. INC.**

fabricators for the aircraft industry

**B.H. AIRCRAFT CO. INC.**

FARMINGDALE, NEW YORK

## Where to Buy PRODUCTS • SERVICES ACCESSORIES

### EXECUTIVE CABIN TEMPERATURE CONTROLS

- AUTOMATIC
- RELIABLE
- FLIGHT-PROVEN

Available for other cabin temperature controls or any other cabin temperature control. Fully installed in minutes. No special tools or equipment necessary. Request for literature. How to use our many B.H. in cabin temperature controls. A-100 and B-100. Write to: Section 1-100.

**BARRETT'S AIRCRAFT COMPANY**  
1231 ROCK STREET  
ROCKFORD, ILLINOIS



## LETTERS

### Working Together

Believe, but raise the low priority, I wish to thank you for the editorial support and cooperation given to AOPA in your magazine following the CAR decision on national rules.

I think this was a classic example of what could be done when all civil aviation groups work together. Any conclusions which we have made now, I believe largely that at least one it was a team proposition.

We in AOPA, of course, felt strongly on the matter of increasing within the civil aviation agencies, and the lack of trust which our segment, in particular, must feel under the present CAA setup. This, we feel, must be corrected and we will lead our efforts along in that direction.

J. B. HARTMANN, Jr.,  
President

Norfolk Owners & Pilots Assn.  
P. O. Box 5960  
Washington 14, D. C.

### Protest From Dayton

With reference to the column "Cockpit Viewpoint" by Capt. B. C. Nelson, in published May 17 in your magazine, we wish to defend the "Military Block" mentioned therein. The following statements stem from one of the lowest positions within the Research & Development Command, Aerospace and they are a result of the current state of duty we feel in a part of the USAF, in particular, and the military, in general.

We first take exception to the source of statistics quoted by Capt. Nelson in his compilation of the "chicken feed" high service personnel (HSP) of all command personnel. The CAA Monthly Summary of Air Traffic Control Operations does not report statistics on command personnel as well as military aircraft. We might just as fairly produce an average based on command personnel at military airfields with an equally high percentage for military aircraft. At no military base does 612 GCA approaches were made by military aircraft during January, 1955, the month selected by Capt. Nelson.

Secondly, with regard to approach lighting systems, we feel that the military is justified in increasing approval of ICAO criteria for approach lighting systems, at least in conjunction with the present personnel at the Landing Aid Experiment Station (LAES), (LAES) under agreement of the ANC (Air Force, Navy, Civil) Subcommittee with Transcon Air Lines as the prime contractor, demonstrated that single-line lighting is conclusively not the optimum system. (Representatives of Capt. Nelson's organization participated in this test.)

As for the 1,500-ft. pattern area required at each end of an Air Force runway, we assume that the forward visibility subcommittee particularly interested in flight category and further augmented by pro-

operation, plus the extended landing with all jet aircraft, under all of us who fly such aircraft especially general that such a restriction exists.

We further note Capt. Nelson to the Doublet Commission findings recently reported in Life magazine (June 3, 1952), and the Commission recommendation that a standard 5,000-foot mile and one-half mile long be provided at the end of each civil runway.

Lastly, we are very much interested in landing with less than one mile visibility, since our mission naturally requires them. Furthermore, several projects are being currently pursued by various units within our organization to allow operation of USAF aircraft during all weather conditions including adverse conditions. The operational limitations of the related equipment associated landing in the worst weather that this facility provides.

In closing, let us emphasize that this letter is written to promote a more fruitful cooperation and mutual understanding between civil and military air personnel in order to stimulate general interest in making instrument flight more safe and efficient.

Max GOSMAN W. BROWN  
Capt. Norman M. FORTSON  
Mr. Eugene T. BOWMAN  
Phase V Test Unit  
HQ, Wright Air Development Center  
Wright-Patterson AFB, Ohio

### Titanium

Your June 1 issue just hit my desk, and I really enjoyed the DeBolt-Harbin piece titled "What We Know About Titanium."

It's the very week to call this article to the attention of a number of people in the company, and am wondering if you can conveniently supply me with ten copies.

GOSMAN DIXIE  
Westinghouse Electric Corp.  
General Center  
461 Liberty Avenue  
P. O. Box 1275  
Pittsburgh 10, Pa.

### "Sharp Reporting"

George Chalmers' splendid report on the P504 as the July 7 Aviation Week was not only colorful but made it as easy as home base but also well enlightening.

Naturally, we hear many good reports about these airplanes from our men in the field—but they can be prejudiced. It is doubly good to read an unbiased reporter's story of what the men in the cockpit and the plane crew on the flight had said about their flight.

Comments on a sharp reporting job: Augusta 1, Pa.,  
Publicity Manager  
Lockheed Aircraft Corp.  
Burbank, Calif.

### Facts From Stanford

We were pleased to note the attention given the flight test program of our Aircraft Evaluation Systems Laboratory on page 38 of the July 14 Aviation Week.

Two small notes on this caption are brought to your attention, as a matter of record. The Institute operated size C-14 and one C-17 in this program, and two C-14s in support. The C-14 shown in the picture is used in the development and evaluation of fuel-injected engines for HF conversions, LF 1000, and various other engine conversions in addition to the VHF work mentioned.

William C. EYRE,  
Chief of Public Relations  
Stanford Research Institute  
Stanford, Calif.

### Praise

Many thanks for publishing with a fine article on our product, the Gyroscopic Sels, in the June 16 Aviation Week. Inquiries and reactions have been coming in from all corners of the country and undoubtedly every plane of engineering. We feel that the article was excellently written.

I have written Mr. Anderson for permission to make photostatic copies of this article in order to enable us to send them to many of our customers and prospects.  
H. J. GOSMAN, President  
The Gyroscopic Instrument Co.  
80 South St.  
Hartford 1, Conn.

I would like to compliment your fine publication on the very comprehensive editorial story which Eric Chalmers did in the July 7/14 Flight Newsletter in the June 16 issue.

The article reflects a thorough grasp of the engineering behind the new gyroscopic—also through in fact, that we plan to report it for use in the military system program we give to all new aircraft.

T. E. MORGAN,  
Manager of Industrial and Public Relations  
and Design, Inc.  
Silverdale, Washington, D. C.

This is a related but nevertheless entire appreciation of your editorial efforts. We like the two-fold, factual manner in which you approach all controversial issues. Keep it up.

Continue your report of conditions in CAA and CAR. It may be little, but we can only hope that you will deliver us cooperation in it as in high places in their agency.

R. L. (The writer is associated with a major of company, is a New England region—E.)

Editor Robert M. Wood: as two most two of certain USAF Air Assault and the reorganization issue. His editorial will be in the next issue of the magazine.



**500  
shakes  
per second**

The spin of this Sperry engine are on tomorrow—even while they classify observe the performance of a Gyroplex® flight control system being vibration tested at 500 cycles per second on a shake table. All Sperry gyroscopes are being constructively "burned" and exposed to conditions more rigorous than they may undergo even in tomorrow's aircraft.

In laboratory, test-cell—and at Great Britain, Canada, and the United States, Navy, Air Force, and Army, Sperry develops and improves its mechanical equipment—and sends test results to the flight control problems of the future.

Today, because of this research background, modern Sperry flight controls are successfully flying jets, bombers, executive jets, helicopters, lighter-than-air ships and guided missiles.

For these widely diversified aircraft, the Sperry automatic pilot provides

consistently smooth, precise automatic flight under all flight conditions.

Many other advances will come—as they have for 40 years—because Sperry's pioneering leadership, skill, experience and know-how contributed in developing automatic flight controls.

(A. B. SPERRY & CO., INC.)

**SPERRY** GYROSCOPE COMPANY  
DIVISION OF THE SPERRY CORPORATION

GREAT NECK, NEW YORK • CLEVELAND • NEW ORLEANS • BIRMINGHAM • LOS ANGELES • SAN FRANCISCO • SEATTLE  
BOSTON • NEWARK • SPERRY GYROSCOPE COMPANY OF CANADA LIMITED, MONTREAL, QUEBEC



# New floating anchor nut by **ESNA**



Type A-41 has same overall dimensions as standard ESNA anchor nut type A-1.



Offset basket design prevents rivet head interference with floating action of nut.

Here is the finest floating anchor nut ever developed—ESNA's type A-41.

#### Consider these design advantages:

1. Envelope dimensions held within limits of AN366.
2. Simplified anchor nut installation methods make cost savings possible. Nut "float" eliminates costly lining-up operations often necessary to accurately install one piece anchor nuts.

3. Offset basket design prevents nut float restriction due to rivet head interference.

4. Approximately thirty percent lighter than previous basket type nuts.

5. The red elastic collar. The self-locking nut principle proved by over twenty years of aircraft usage and billions of installations.

Floating basket nuts are also available in other configurations.

**LOOK TO ESNA** for self-locking fasteners that cut assembly costs and save weight. Mail coupon for design information.



**ELASTIC STOP NUT CORPORATION OF AMERICA**  
IS ALSO MAKER OF THE **ROLLPIN**



**Dept. N25-725, Elastic Stop Nut Corporation of America**  
2330 Vauxhall Road, Union, N. J.

Please send me the following free information:

- |  |   |
|--|---|
| <input type="checkbox"/> Drawing of type A-41      | <input type="checkbox"/> Rollpin Bulletin   |
| <input type="checkbox"/> Elastic Stop Nut Bulletin | <input type="checkbox"/> Here is a drawing of our product. What self-locking fastener do you suggest? |

Name \_\_\_\_\_ Title \_\_\_\_\_

Firm \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_